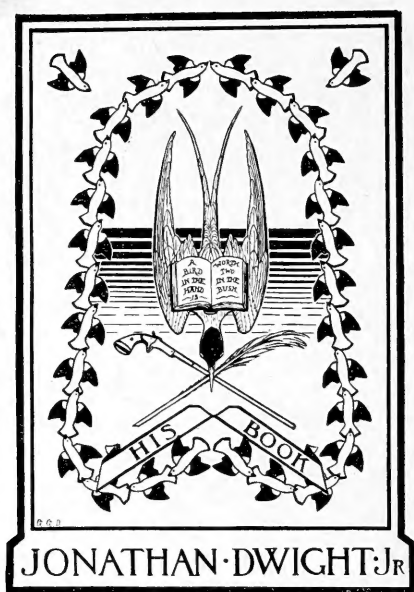
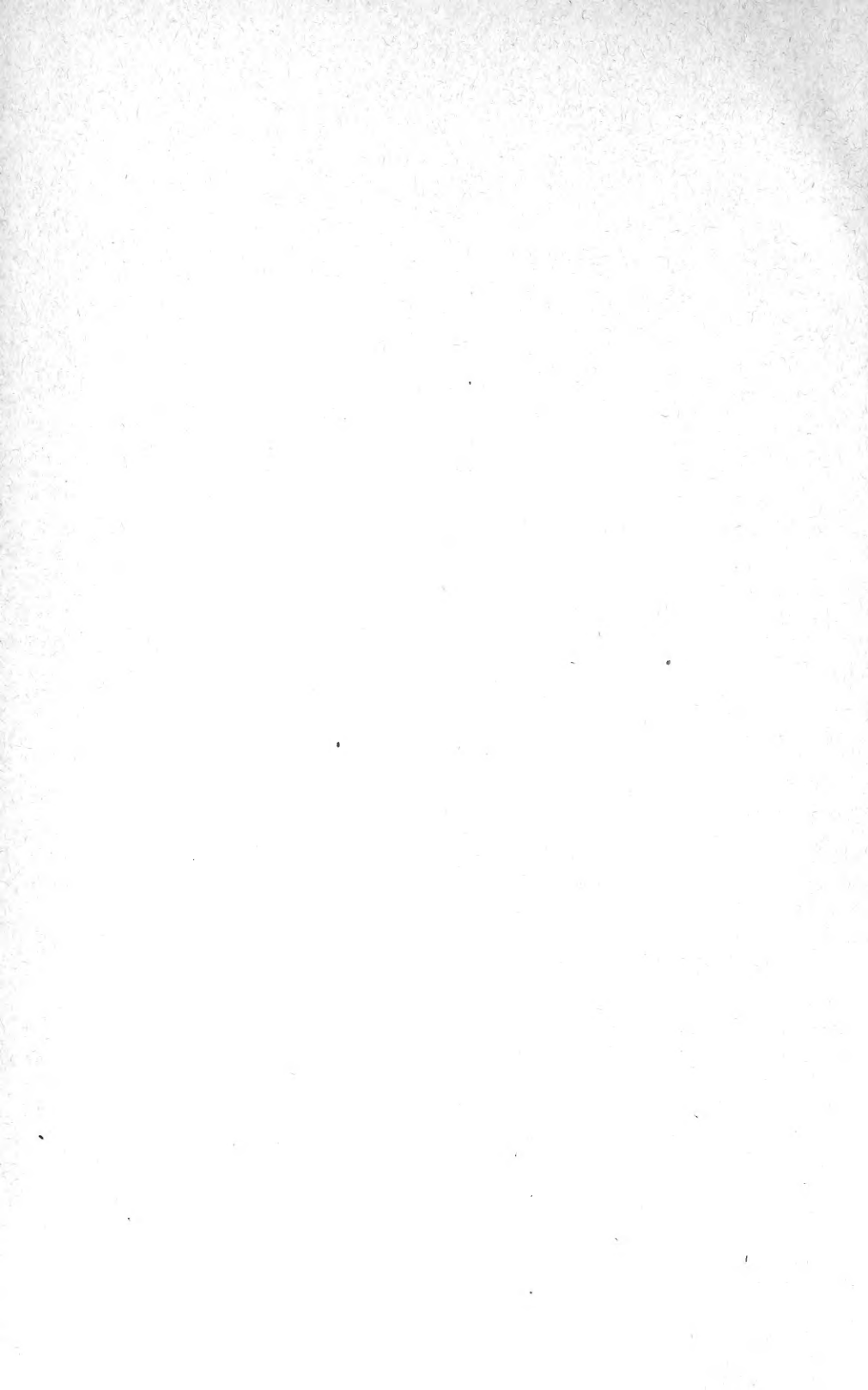


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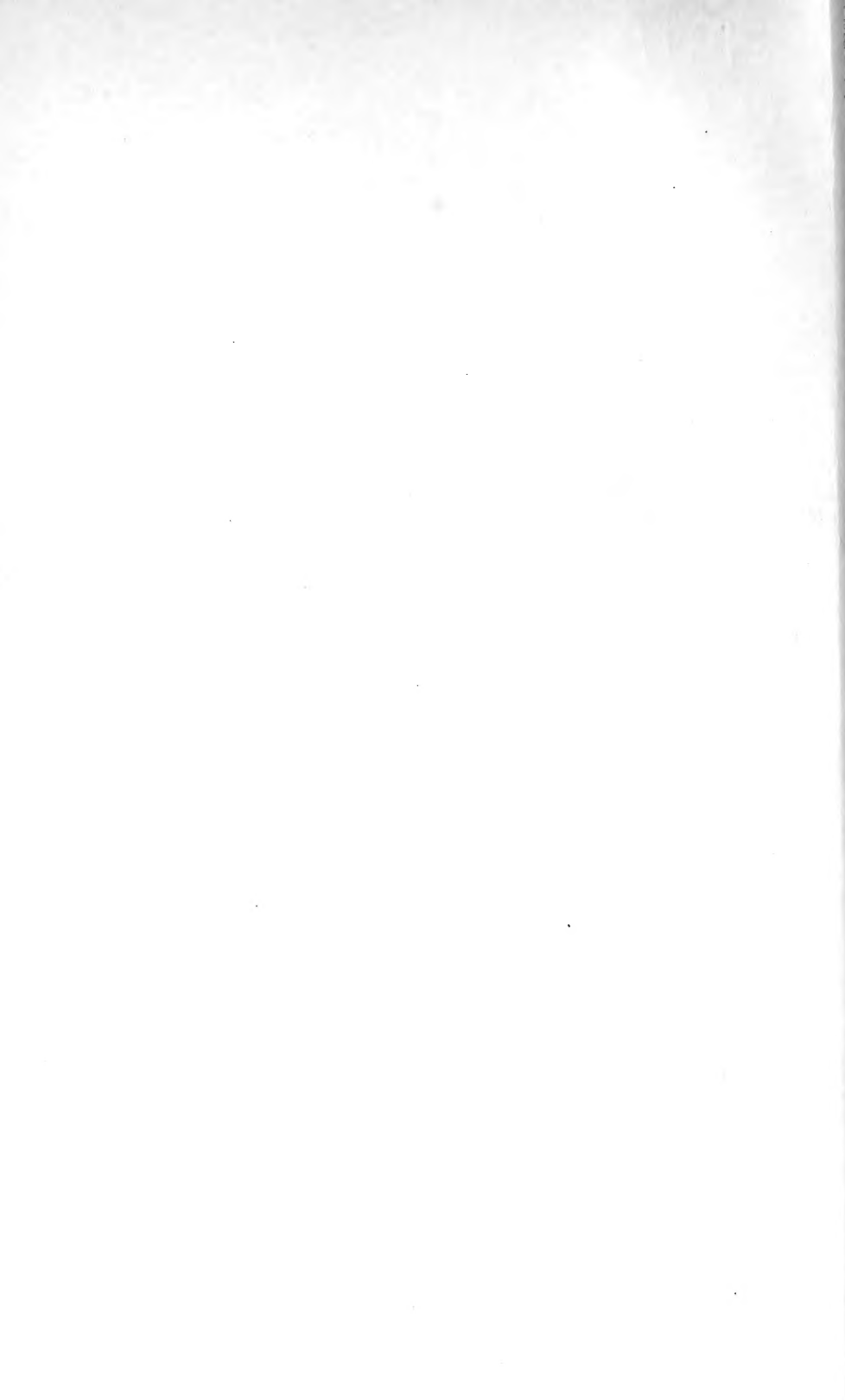
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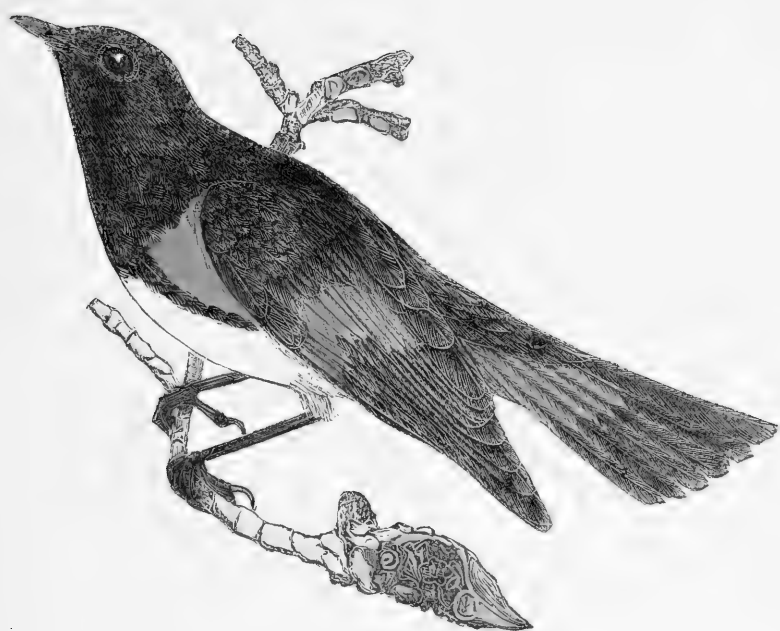
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FRONTISPIECE.

American Redstart, male.







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BY TRIFLES IS THE MEMORY STIRRED
RECALLING THINGS LONG PASSED AWAY;
THE SCENT OF ROSE OR NEW-MOWN HAY.
THE TINT OF CLOUD AT CLOSE OF DAY,
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No.

INTRODUCTION.

The relationship between author and book in this work is much closer than usual. The author has not only used his pen, but also pencil, engraver, brush, and press in producing the book. Thus in the Warblers of New England the reader will find embodied the author's idea of the classification of this group of birds, of the form and coloration of the species, and of the typography of the text as well as he has been able to present these subjects. In short, the book is original from title to end.

This book has been written especially for friends and pupils in order that they may have, in a permanent form, what the author has taught them regarding a family of birds, the members of which, presenting, as they do, bright and beautiful patterns of coloration, and singing, as they do, quaint and often sweet songs, are, among all of the attractive songsters of copse and woodland, preeminently the gems. American Warblers—exclusively our own—throughout the world we find no finer group of birds, thus they may well be considered the pride of the American ornithologist.

C. J. M. WEST NEWTON, MASS.: OCT., 1901.

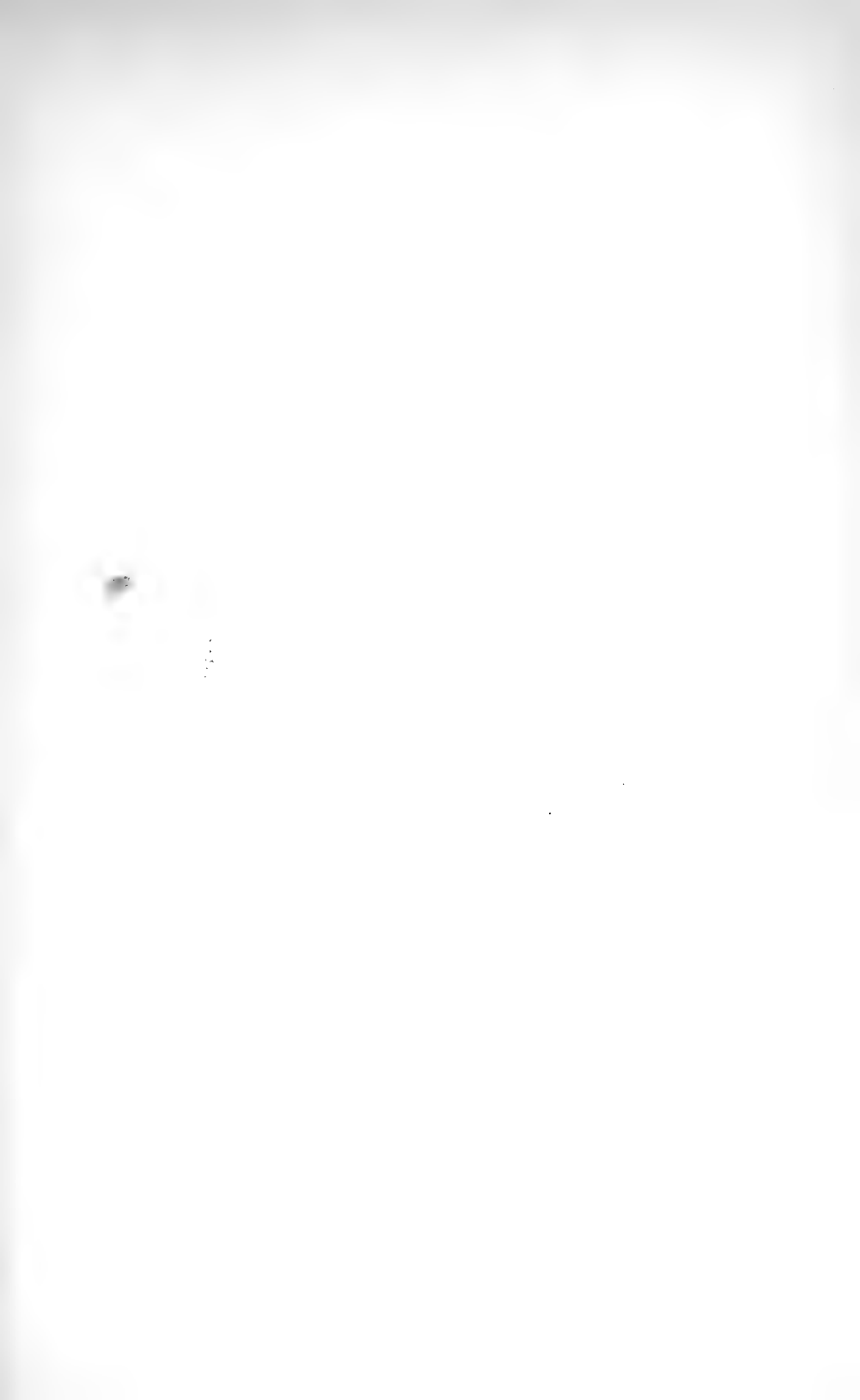


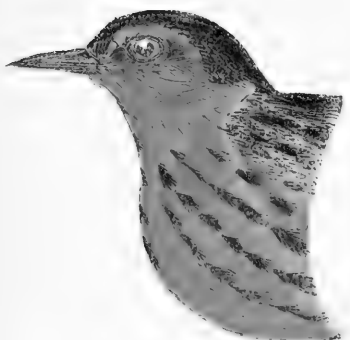
PLATE I.



1



2



3



4



5



6

EXPLANATION OF PLATE I.

Black and white Warbler, 1, male, 2, female.

Cape May " 3, " 4,

Black-throated Blue, " 5, " 6, "

AMERICAN WARBLERS.

Family Mniotiltidae.

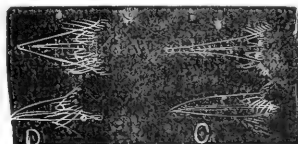
Small birds, less than six inches long. The bill is never longer than the head. The elongated flight primaries are nine. The tail feathers are twelve. The colors of most of the species are conspicuous and showy, yellow, black, and white, appearing in patches and streakings, while others are prominently marked with orange, salmon etc. Restricted in distribution to the continent of America and adjacent islands.

The size of the members of this family is quite uniform, the smallest species being about four and a half inches long and the largest not over five and three quarters inches long. The bill is variable in length. In the species which we have under consideration, it is shortest proportionately in the Flycatching Warblers, notably in the Wilson's Black Cap (See Fig. 1, A) and longest in the Yellow-throated Warbler. (See Fig. 1, B). It is usually slen-

FIG. 1.



A, bill of Wilson's Black Cap.
B, bill of Yellow-throated Warbler.



C, bill of Black and White Creeper.
D, bill of Redstart.

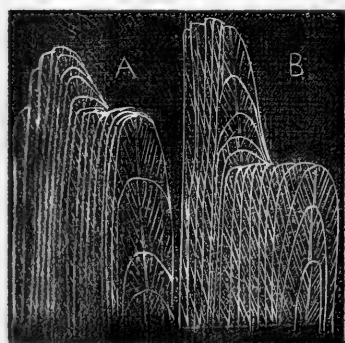
der, not being wider at the base than one half its length, as in most members of Wood Warblers, (*Dendroica*) but in some of the Flycatching Warblers it is wider at the base than one half its length. It is much slenderer in the Black and White Creeper (See Fig. 1, C) and widest in the Redstart (See Fig. 1, D). There are usually few bristles at the base as in the Black and White Creeper (See Fig. 1, C) but in the Flycatching Warblers, the bristles are strongly developed (See Fig. 1, D). The bill is slightly notched at the tip, but never prominently so, nor is it hooked at the tip, nor are the edges of the mandibles angled.

The head is not disproportionately large, and the eyes are not especially prominent.

The wings are usually much longer than the tail, the tips reaching when folded a little beyond its middle, but in some species, as in the Connecticut Warbler, they are longer than this, while in the Maryland Yellow-throat and other species of the genus to which this bird belongs, the wings are shorter than the tail, and the tips of the folded wings do not reach its middle.

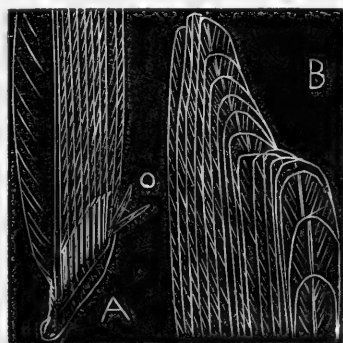
The wings are never pointed, the first four quills varying but little in length (See Fig. 2, where I give a figure of the primaries of the Yellow-rumped Warbler) but in the non-migrating species of the Ground Warblers which inhabit the Bahamas, the wings are so decidedly rounded that the first and eighth primaries are about equal in length, the second is about equal to the sixth, while the third, fourth and fifth are equal in length. (See Fig. 2 B, where I have given a cut of the tips of the primaries of the Greater Bahama Yellow-throat, *Geothlypis rostrata*).

FIG. 2.



A, primaries of Greater Bahama Yellow-throat. B, primaries of Yellow-rumped Warbler.

FIG. 3.



A, base of primaries of Yellow-rumped Warbler. B, Wing of Connecticut Warbler.

As in the Sparrows and Finches, the long primaries are nine, but there are really eleven primaries, the two first being much shortened, and are found growing over the first and second long quill. See Fig. 3, A where I give a cut of the base of the primaries of a Yellow-rumped Warbler with the two spurious, or shortened primaries bent outward at O.

The secondaries are never as long as the longest primaries. They are as long as the ninth primary, however, in the Parula Warbler and some other genera and species, but in the Connecticut Warbler and Black and White Creeper, they fall decidedly short of the ninth primary, while in most, or all, of the Ground Warblers, (*Geothlypis*) they a little exceed it in length. Thus they are proportionately longest in the Connecticut and allied species, and proportionately shortest in the Ground Warblers. (See Fig. 3 B, where I give the tip of the wing of the Connecticut, and contrast with Fig. 2 A, where is given the tip of the wing of the Greater Bahama Yellow-throat.)

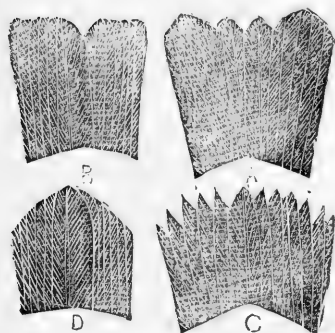
The tail is often slightly emarginate, (See Fig. 4 A, where I give the tip of the tail of a Nashville Warbler) but is sometimes square, as in the Cape May

Warbler, (See Fig. 4, B) or somewhat rounded as in the Prairie Warbler. Fig. 4, C, or considerably rounded as in the Maryland Yellow-throat and allied species. See Fig. 4, D.

The entire foot (tarsus and toes) is largest and strongest in the Ground Warblers, (*Geothlypis*) smallest and weakest in the Parula Warblers, but the toes are proportionately largest in the Black and White Creeper (See Fig. 5 : A is the foot of the Maryland Yellow-throat : B, the foot of the Parula Warbler ; and C of the Black and White Creeper).

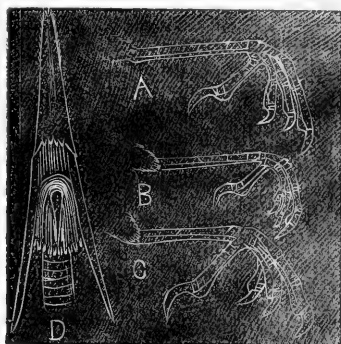
The typical sternum among the American Warblers, is one in which the

FIG. 4.



Tails of Warblers. A, Nashville; B, Cape May; C, Prairie; D, Maryland Yellow-throat.

FIG. 5.



A, foot of Maryland Yellow-throat; B, " " Parula; C, foot of Black and White Creeper; D, Tongue of Yellow Red-poll, enlarged.

coracoid bones are about equal in length to the top of the keel, or a little shorter. The marginal indentations, are about equal in depth to the height of the keel, the other characters agreeing quite closely with the ordinary Passerine sternum. (See Fig. 9, A, sternum of Kirtland's Warbler.) From this we find the variation consists in the keel being proportionately higher, reaching its maximum development in members of the genus *Oporornis*, Long-winged Warblers, or proportionately lower, as in the Ground Warblers, in which genus the coracoid bones are considerably lengthened, being longer than the keel. See Fig. 9, B, sternum of the Maryland Yellow-throat. Thus the entire sternum is proportionately longer in this genus than in any other of the family which I have examined.

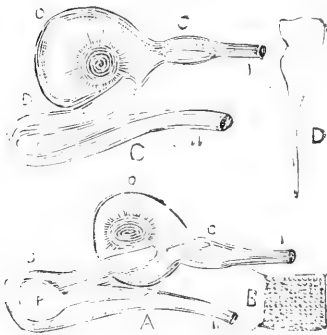
The typical tongue of the group is thin and horny, slightly cleft at the extremity which is provided with fine bristles, or cilia that extend somewhat along their sides. (See Fig. 5, D, tongue of Yellow Red-poll Warbler enlarged). Departures from this rule consists in a tongue which is more fleshy at the base, becoming suddenly thin and horny at the tip, as in the Blue Yellow-back and Black-poll Warblers. It is rather more fleshy in the Yellow-rumped Warbler, but still thin at the tip, bifid and ciliated. The maximum

degree of fleshiness is reached in the tongue of the Worm-eating Warbler, where the entire organ is thick and fleshy, something like those of some Sparrows, and is not ciliated. We find the greatest development of bristles or cilia in the Tennessee and Cape May Warblers, where the terminal portion of the tongue is narrowed and cleft for at least ten hundredths of an inch in depth, and the bristles are about six hundredths of an inch in length. (See Fig. 7 A).

The trachea is often slightly expanded near upper larynx, but becomes widened and straight as it descends. Through a fusion of the bronchialis with the broncho-trachealis muscles of the lower larynx, the singing muscles are reduced to three pairs. (See Fig. 7, B, 11, enlarged larynx of Kirtland's Warbler). Occasionally, however, there is an indication of development of the shorter bronchialis:

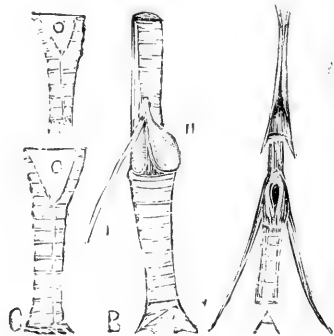
The bronchial tubes are rather short, the half rings varying in number from eight or nine (Maryland Yellow-throat) to twelve or thirteen (Kirtland's Warbler.)

FIG. 6.



A, Stomach of Kirtland's Warbler; B, Proventriculus of same laid open, enlarged; C, stomach of Greater Baltimore Yellow-throat. D, pancreas of another specimen enlarged.

FIG. 7.



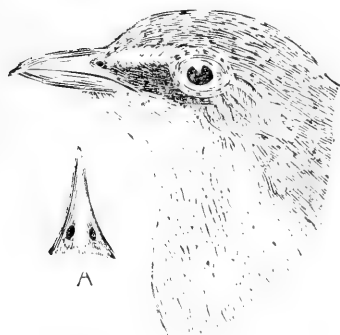
A, tongue of Cape May Warbler; B, lower larynx of Kirtland's Warbler; C, bronchial tube of same; D, bronchial tube of Maryland Yellow-throat. All figures enlarged.

The vibrating, tympaniform membrane is short, occupying but a small portion of the upper bronchial tube, extending over only about four or five half rings and is thus somewhat triangular in form. (See Fig. 7. A, lower larynx of Maryland Yellow-throat, and C, Kirtland's Warbler both enlarged; o is the tympaniform membrane.)

The os transversale is present, but the semiluna membrane is either absent (Kirtland's Warbler) or but slightly developed (Maryland Yellow-throat) hence, as we may expect, with this limited amount of vibrating apparatus, the songs of these birds are never very loud and varied, yet some of them are exceedingly sweet, as in the Prairie Warbler, but some are very feeble, as in the Black-poll Warbler.

The oesophagus is without dilatation or crop of any kind and varies in length from one inch (Black and Yellow Warbler) to one and a half inches (Greater Bahama Yellow-throat). The proventriculus is short, twenty-five hundredths of an inch (Black-throated Blue Warbler) to forty hundredths (Bay-breasted.) The glands are simple and are arranged in a zonular band. See Fig. 6 B, proventriculus of Kirtland's Warbler, laid open and enlarged. The stomach is round and flattened, .45 by .45 by .25 in Kirtland's Warbler. See Fig. 6 A, o. The walls are never very muscular, varying in thickness from five hundredths of an inch, (Parula Warbler,) to thirteen hundredths, (Black-throated Blue Warbler.) The lining membrane is always soft.

FIG. 8.



Head of Yellow-breasted Chat. A, upper mandible of same.

FIG. 9.



A, sternum of Kirtland's Warbler; B, sternum of Greater Bahama Yellow-throat; C, viscera of Kirtland's Warbler.

The fold of the duodenum is not disproportionately long. See Fig. 6. A D, varying from thirty-five hundredths, (Greater Bahama Yellow-throat, Fig. 6, C, D,) to seventy hundredths, Black and Yellow Warbler. The pancreas is usually small and quite regular in form. See Fig. 6, C P, but is sometimes larger and quite irregular (Kirtland's Warbler) this variation may, however, be due to individual variation, as I find another specimen of the Greater Bahama Yellow-throat with an irregularly formed pancreas. See Fig. 6, D.

The intestine is short and proportionately wide. It varies in length from three inches (Black-throated Blue) to four and a half inches, (Kirtland's Warbler.)

The coeca are very small and adhere closely to the intestine, in a similar manner as seen in Fig. 12, B.

The heart is small and pointed, measuring forty by twenty-five hundredths of an inch in Kirtland's Warbler. See Fig. 9, H.

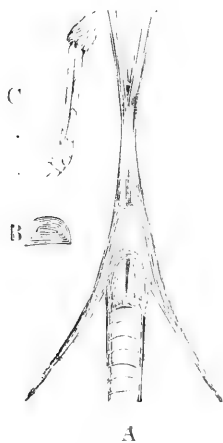
The right lobe of the liver greatly exceeds the left in size. See Fig. 9.

The spleen is a cylindrical shaped body lying on the proventriculus, or sometimes partly on the proventriculus and partly on the stomach, Blue Yellow-back Warbler, (see Fig. 6 below C,) and it is almost always straight, but sometimes bent.

The food of the Warblers, as may be expected from the account of the alimentary canal given in the foregoing, consists largely of insects, but I have taken lizards from the stomachs of the Greater Bahama Yellow-throat, which were longer than the bird. This species also feeds on insects and berries.

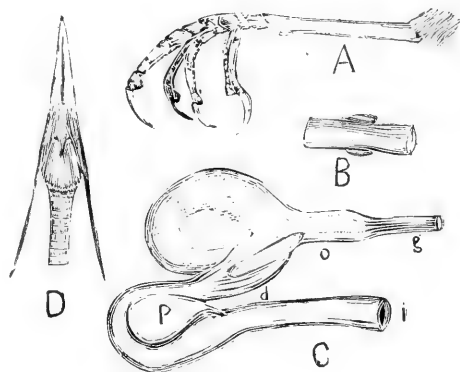
Many species of Warblers are migratory, but some of those which occur in the tropics are constantly resident in the sections in which they occur. The migrating species are generally the most widely distributed during the breeding season, while the resident species are sometimes restricted to single islands.

FIG. 10.



Organs of Bahama Honey Creeper; A, tongue; B, section of same; C, tarsus. All enlarged.

FIG. 11.

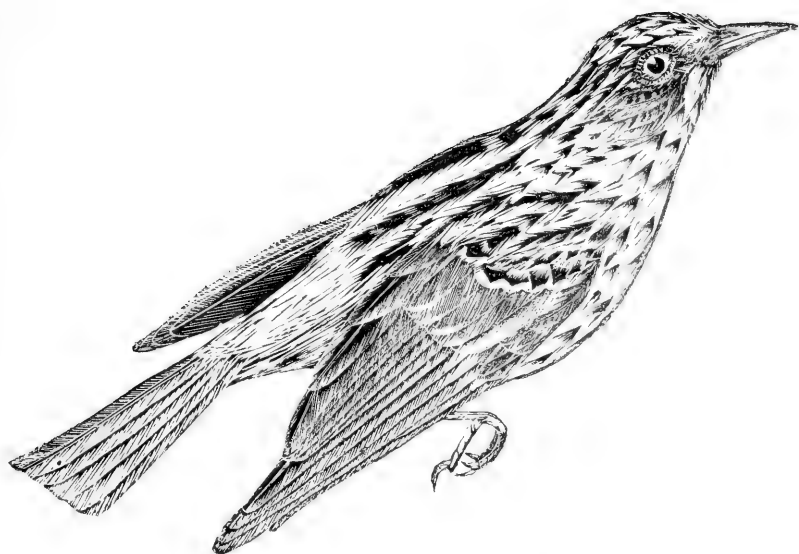


Organs of Yellow-breasted Chat; A, foot; B, corac.; C, stomach; D, tongue. All enlarged.

COMPARISONS WITH ALLIED FAMILIES.

What has been considered as one of the most closely allied families to the American Warblers is that containing the Honey Creepers. These have nine primaries and a somewhat similar form to those of the American Warblers, but the bill of the Honey Creepers is more strongly curved and is sharper. See Fig. 13. The tongue of the Honey Creepers, in typical species, like the Bahama Honey Creeper, is not unlike that of the Cape May Warbler, being cleft at the tip and provided with bristles, while the sides are rolled over, See Fig. 10, but

FIG. 12.



Arrow-head Warbler, *Dendroica pharetra*, Jamaica.

the stomach of the Honey Creeper is very small and resembles that of a Humming Bird. See Fig. 13.

Another allied family is that containing the Wood Wag-tails, Seiuridae. This is a group of birds of which the Golden-crowned Thrush is a familiar example, and which by most authors, is considered as belonging to the family of Wood Warblers, but as the Wood Wag-tails differ in a number of characteristics from the Warblers, I separated them from the family in the second edition of my Birds of Eastern North America, page 623. The Wood Wag-tails have nine primaries, but the sternum is much more nearly like that of a Thrush. See Fig. 15, where at A I give a cut of the keel of a Water Wag-tail, and at B that of a Wilson's Thrush. Compare these with the sternums of Warblers on page 5, Fig. 9. The Wag-tail Thrushes also differ in habit. For further remarks upon this subject, see Birds of Eastern North America, page 623. See Fig. 16 for head of Golden-crowned Thrush, and Fig. 17 for head of Louisiana Water Thrush.

Another group of birds which have usually been classed of late with the Warblers are the Chats, family Icteriadae, of which the Yellow-breasted Chat is an example. Just how this bird resembles the Warblers, excepting in having nine primaries, it is difficult to state. The differences are, however, quite obvious. It is a large bird, about twice the size of the largest Warbler. The bill is thick, with no indication of a notch at tip: the tarsi are without scales. The tongue is not cleft at tip nor ciliated, and the stomach is quite muscular. See Fig. 8 for head of Yellow-breasted Chat, and also Fig. 11 for foot, tongue, and stomach: B, coeca.

With the Vireos, the Warblers are quite distantly related, but these birds have a thick, curved, well notched bill. See Fig. 16 where I give the head of a Warbling Vireo.

On page 7, Fig. 12 is given a full-sized cut of the Arrow-headed Warbler which is about a typical warbler in form.

GENUS. CREEPING WARBLERS. *MNIOTILTA*.

Size medium, 5.00 to 5.50 long. Colors, wholly black and white. Tail with white spots.

The single species which forms this genus is a slenderly formed bird, with a bill that is not quite as long as the head, and slightly curved. The folded wings reach a little beyond the middle of the tail; but the most remarkable character is seen in the large hind claw, which exceeds in length the middle toe and claw, and is about as long as the tarsus. (See Fig. 5 C). This modification enables the bird to

FIG. 13.



Stomach of Bahama Honey Creeper.



Bahama Honey Creeper.

creep about the limbs of trees, even on the under side of the branches. This is chiefly a woodland species. (See Plate I, Fig. 1 for type form.)

BLACK AND WHITE CREEPER.***Mniotilta varia*.**

Plate 1, Fig. 1, male; Fig. 2, female.

Size, 5.00 to 5.50. Black and white in stripes, with conspicuous white wing bands, and a distinct white line on top of head. Inhabits woodlands, from May 1st to Sept. 10th. Breeds, common.

MALE. Black above, narrowly streaked with white. Top of head with conspicuous central white stripe, and there is a white line back of eye, extending to nape, and the tertiaries are broadly margined with white. White beneath, broadly streaked on throat, sometimes forming a patch, breast, sides, and under tail coverts, with black: inner webs of wings broadly margined with white, so that the wing appears nearly white beneath as the bird flies. Two outer tail feathers, with a terminal white spot which is confined to the inner web. See Fig. 23, A.

FEMALE. Similar, but duller, with not as much black either above or below, and beneath the white is overwashed with buffy.

Young of both sexes similar to the females, but with the white above and below, rather more obscured with rufous.

DIMENSIONS. Length, 5.25; stretch, 8.60; wing, 2.75; tail, 1.95; bill, .50; tarsus, .60.

FIG. 16.



Golden-crowned Thrush.

FIG. 17.



Louisiana Water Thrush.

COMPARISONS. We have one only among our northern Warblers with which this species need be compared, and that is a bird of wholly different form and habits, but with generally similar colors, the Black-poll Warbler, but this species has the top of the head wholly black, without the white median line, and the sides of the head are white, not black as in the Creeper. For comparison with the Jamaica Arrow-head Warbler, see Synopsis at the end of the Wood Warblers, also see Figs. 12, 19, and 20.

NESTS AND EGGS. Nests usually placed on the ground, composed of mosses, grasses, and leaves, lined with fine bark, fine grasses and hair, almost always placed near a rock, tree trunk or log, in the woods.

Eggs, from 3 to 5 in number, oval in form, pale bluish in color, dotted and finely spotted irregularly over the whole surface, but rather more thickly on the large end with brown and lilac. The fine spottings over the entire surface are the chief characteristics.

Dimensions, .70 by .50 to .80 by .56.

GENERAL HABITS. Aside from the Woodpeckers, none of which need ever be mistaken for Warblers, we have four species of birds in New England which creep about the limbs of trees. Two of these are Nuthatches, both stout birds without stripings, and with peculiarly formed bills. (Fig. 22, Red-bellied Nuthatch;) the third is the Brown Creeper; a species brown in general coloration, and with a long, slender bill (See Fig. 21) and the fourth is the Black

FIG. 18.



Warbling Vireo.

FIG. 15.

A, keel of Water Thrush;
B, keel of Wilson's Thrush.

and White Creeper, wholly unlike any other species of creeping birds. Thus when we see a little bird striped black and white, creeping about the limbs of trees, most usually in the woodlands, often in low scrub, and not uncommonly in orchards and shrubbery about houses in spring, we may be sure that it is a Black and White Creeper.

It is astonishing with what celerity these little warblers move about the limbs, now under them, now over them, gliding everywhere with the greatest ease, and assuming all imaginable positions, now head downward, that they may peer into a crack in the bark which may contain an insect, or reaching upward on tiptoe in order to seize some tempting tit-bit from an overhanging twig. In fact, their agile and eccentric movements most emphatically proclaim the Black and White Creepers as the acrobats among Warblers.

BREEDING HABITS. The Black and White Creepers begin to nest in New England the last week in May, and the eggs are usually all deposited by the first of June and in some cases earlier than this, as I have seen the young flying about, but not fully fledged on June seventeenth.

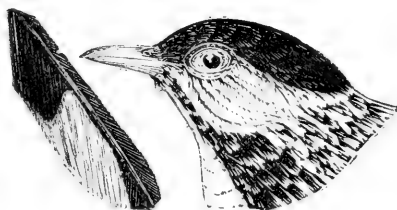
According to my experience, the nesting site chosen by this bird is a hill side sloping up from swampy ground, and the nest is placed near the base of a tree, beside a rock or prostrate log, but doubtless the birds occasionally depart from this rule, in fact, it is on record that they sometimes breed in holes. Mr. Minot also says that he has found the nest in a cavity of a tree cleft by lightning, five feet from the ground, and again on the top of a low birch stump.

FIG. 19.



Black and White Creeper.

FIG. 20.



Black-poll'd Warbler.

The female Black and White Creeper is very solicitous for the safety of her eggs and young, and like many species of birds which deposit their eggs on the ground, feigns lameness when disturbed.

SONG. The ordinary call note of the Black and White Creeper is a weak, lisping cry, which can be given harsher and louder. The alarm note is louder, more metallic and double. They have two ways of singing, one, the ordinary method, being a weak, lisping five-fold repetition of the syllable, "wee see" and a louder and longer lay in which

the terminal syllable is considerably prolonged. The Birds never pause and make a business of singing, but continue in active motion all the time they are uttering their notes.

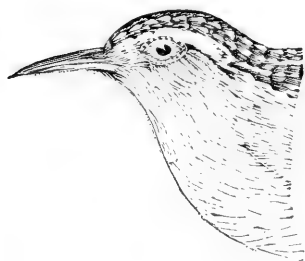
MIGRATION AND BREEDING RANGE. Breeds from Virginia and Southern Kansas north to Hudson's Bay. Migrates south in early September to winter in Florida and the Gulf States, the Bahamas, Greater Antilles, and Cayman Islands. Returns north to New England from the last week in April to the first week in May.

GENUS. HONEY WARBLERS. PERISSOGLOSSA.

Size, medium, 4.70 to 5.50 long. Colors, yellow beneath, black streaked; olive above; cheeks chestnut. Tail with white spots.

The single species which forms this genus, is a moderately stout bird, with a slender, quite sharp bill that is a

FIG. 21.



Brown Creeper.

FIG. 22.



Red-bellied Nuthatch.

little curved at the tip. The folded wings reach a little beyond the middle of the tail. The most remarkable character is found in the tongue, which, although somewhat fleshy at the base, rapidly becomes thin at the tip. The edges of the terminal half are curved inward, thus forming a kind of tube, while the tip, cleft for about ten hundredths of an inch, is provided with coarse cilia. (See Fig. 7 A.) This peculiar lingual arrangement enables the birds to feed upon the sweet juices of flowers.

In the second edition of the *Birds of Eastern North America*, page 599, I have stated that I did not consider the characters used for the separation of the Cape May Warbler from the genus *Dendroica* of sufficient value to warrant raising the bird to generic rank. A more careful study of the American Warblers, especially in regard to the origin of species and forms, has led me to different conclusions as expressed above.

CAPE MAY WARBLER.

Perissoglossa tigrina.

Plate I, Fig. 3, male ; Fig. 4, female.

Size, 4.70 to 5.50. Dusky olive above; top of head black. Rump and under parts bright gamboge yellow, the latter streaked on sides with black. Patch on side of head chestnut. Broad wing band white.

Migrating about May through Southern, to breed in Northern, New England. Rare in the eastern sections.

MALE. Above greenish, with top of head black, and back streaked with black. Rump, line over eye, and under parts, excepting abdomen, which is white, yellow. Streaked on throat, breast and sides with black, ear coverts, chestnut, and there is a tinge of this color on the throat and a line over eye: wings brown, edged with greenish, and there is a broad, white patch on the wing coverts. There is a white spot, a little less than three quarters of an inch long on the inner web of outer tail feather (See Fig. 23, B) which does not, however, extend to the tip of the feather. There is a shorter spot on the second feather and a smaller patch on the third.

FEMALE. Grayish olive above, with rump slightly yellow. Beneath, grayish white, tinged with yellow, somewhat indistinctly streaked with dusky. Four outer tail feathers are spotted with white, and this is not as extended as in the male.

YOUNG AND ADULTS. In autumn, much obscured by grayish and yellowish suffusions, and the female is often without a trace of yellow.

DIMENSIONS. Length, 4.20 : stretch, 8.11 ; wing, 2.10 ; tail, 1.85 ; bill, .50 : tarsus, .95.

COMPARISONS. The adults of this fine Warbler stand so completely separated from all others that there is no need of comparisons. The chestnut patch on the sides of the head and conspicuously streaked under parts, are sufficient to identify the males. The adult females somewhat resemble those

of the Pine Warbler in being gray, but the female of the Pine Warbler never has a yellowish rump nor is she streaked beneath. The young female Cape May more nearly resembles the Pine Warblers, but even here the dusky stripings are always present in the Cape May.

NESTS AND EGGS. Nests placed in trees composed of small pine twigs, grasses etc., lined with finer material; they are rather deeply cup-shaped.

Eggs, three or four in number, oval in form, dull white, often buffy or grayish. Spotted and dotted around the large end with reddish or dark brown and lilac, sometimes with smaller markings or lines of blackish. Dimensions, .70 by .52 to .73 by .55.

GENERAL HABITS. The Cape May Warblers are rare spring visitors to Eastern Massachusetts, appearing here, when they come at all, in May with the blooming of the apple trees, and the flowers of these trees appear to be particularly attractive to them.

My experience with the Cape May Warblers, on what was once their breeding grounds in North Western Maine, shows that here they lived in the tops of the high coniferous trees of that region. This is, however, quite at variance with my experience with them elsewhere. On Key West, in autumn and winter, they frequent gardens about houses, searching among the fruit trees for food, and appear to prefer the more settled portions of the island. In spring, however, they may be found in almost every hammock throughout Florida, feeding with other Warblers at moderate heights above the ground.

Throughout most of the Bahama Islands, where they occur scatteringly during winter, they feed in the low scrub, in company with other Warblers, but I found them very abundant in February on the Island of Inagua feeding in company with the Bahama Honey Creeper and Lyre-tailed Hummingbird upon the sweet juices of a large tubular flower of a peculiar species of vine.

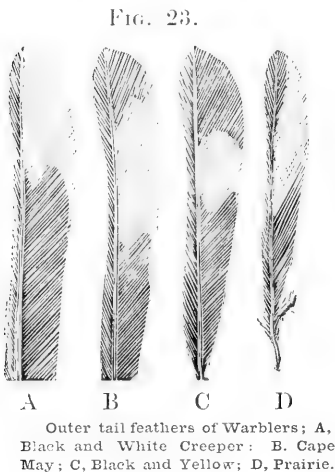
In April I found them in great abundance on the Island of Eleuthera feeding with some other Warblers, Honey Creepers, and Hummingbirds, on the singular flowers of

the Agave, known as the sisal-hemp. While the other species of Warblers were doubtless attracted to these flowers by the numerous insects with which they were surrounded, and which the birds were constantly springing into air to catch, it is evident that the Cape May Warblers were eating the sweet juices of the flowers and are true Honey eaters, as the peculiar structure of their tongue would seem to indicate. (See Fig. 7, A, page 4).

Both the Creepers and Cape May Warblers are experts in obtaining honey from flowers, for both are endowed with the power of clinging in all kinds of attitudes to the stems of the plants in order to reach into the flowers.

I have seen the Creepers cut holes in the base of the corallas of such flowers as have tubes too long for them to reach the base with their bills, and it is quite probable that the Cape May Warblers do the same thing.

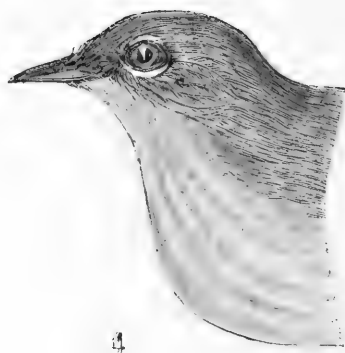
The Cape May Warbler is a nervous, active bird, seldom remaining long in one spot, and when a large number of them are feeding on the flowers of a large plantation of sisal-hemp, they are so constantly changing from one plant to another, or flying out into the neighboring scrub that the air is so constantly full of these birds darting back and forth, that they resemble a swarm



of bees.

BREEDING HABITS. In my Birds of Eastern North America, I have stated that, judging from my experience with the Cape May Warblers at Eroll, New Hampshire, in the summer of 1871, I thought the nests must be placed well up in the evergreen trees which the birds were frequenting, and while this might have been the case, then at that time no nests were actually found to prove this theory.

PLATE II.



EXPLANATION OF PLATE II.

Yellow-rumped Warbler, 1, male, 2, female.

Aububon's “ **3.** “ **4,** “

Black and Yellow “ **5,** “ **6,** “

Nests which have been actually taken since that time, but elsewhere, were found in evergreen trees, but not far from the ground.

Just what the breeding habits of the Cape May Warbler were in the coniferous forests about Lake Umbagog, where it was once so abundant as a summer visitor, we may never know, for Mr. Brewster, who has visited this region constantly, tells me that he has not found this warbler anywhere in Northern New England since 1879. Some birds may, however, still breed in the extreme northern portion of Maine.

SONG. The Cape May Warblers which I found on the Island of Eleuthera, Bahamas, were singing about the first of May. The song is a lively, but not loud, warble, characteristic enough to be distinguished from that of other warblers, but rather difficult to describe in words.

MIGRATION AND BREEDING RANGE. Breeds from Northern New England northward. Migrates south in early September. They appeared at Watsontown, Pennsylvania, September third, 1879, and continued to pass until the twenty-second of the month, at which date I saw a few. Winters in Key West, Florida, where it is not very common, Bahamas, where it is rather uncommon, but abundant on Inagua; also common in Jamaica; reported from the other of the Greater Antilles and St. Croix. Migrates through the Bahamas on its way north during the last two weeks in April. The males about all disappeared by May first, but the females remained common until about the third, and I found one single specimen as late as May fifth, 1897, on Salt Key among other migrating warblers. Occurs in Florida in spring about the same time as it is found on the Bahamas. I got a single specimen at Williamsport, Pennsylvania, May 10, 1876. If it occurs in Massachusetts at all, it should be looked for about the middle of May.

GENUS. WOOD WARBLERS. DENDROICA.

Size medium, 4.50 to 5.80. Colors, various, often marked in spots, streaks, and patches with black, white, yellow, and, rarely, with orange. Tail always with white spots. Wing bands either white or some light color. Bill about two thirds as long as the tarsus.

There are some fifteen species of this genus found in New England. The bill is not as sharp as in members of the last genus, and the upper mandible is distinctly notched at the tip, but the bill is not curved. The folded wings reach about to the middle of the tail. The tongue, although somewhat variable, is never as deeply cleft as in the last genus, nor is it provided with coarse bristles. (See fig. 5 D, where I give the tongue of a Yellow Red-poll, which is about typical of the genus). The species feed mostly upon insects.

The white spots on the outer tail feather not only differ in form with every species, but are very similar in the two sexes, in every stage of plumage, from the nestling to the adult. Thus, allowing for some difference in size, due to age and sex, the form of these spots offers a very good key to the species.

BLACK-THROATED BLUE WARBLER.***Dendroica caerulescens.***

Plate I, Fig. 5, male; Fig. 6, female.

Size 4.75 to 5.75. Dusky blue above; white beneath; sides of head, throat, and line on sides black. Patch at base of primaries, white.

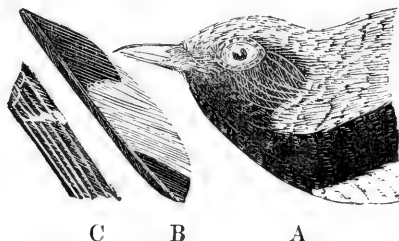
Migrate about the middle of May, as a rule, through Southern to breed in Northern New England. Rather common during some seasons. Returns in early September.

MALE. Above, dusky blue, occasionally spotted with black. White beneath, with throat and line along sides, black. Wings and tail very dark brown, with each feather margined externally with bluish. Base of all but outer and inner primaries white, forming a conspicuous patch, and all the secondaries are margined with white. The outer tail feathers are spotted on inner webs with white, each feather being surrounded by a smaller spot, the form of the spot on outer being given at Fig. 24, C.

FEMALE. Grayish green above, often showing bluish in some lights. The wing spots, although always present, (See Fig. 24, B) is frequently very small. Beneath, buffy yellow, tinged with grayish green on sides. The spot on the outer tail feather is either very faint or replaced by a little white on the inner web near the termination of the feather.

There is frequently a superciliary stripe, and ring around the eye, of yellowish.

FIG. 24.



Black-throated Blue Warbler. A, head; B, outer tail feather, both of male; C, spot at base of wing of female.

ADULTS IN AUTUMN. Scarcely different from the spring dress. Young males at this season have the head above overwashed with oliveaceous. Beneath the black and yellow is faintly obscured with whitish.

NESTLINGS. MALE. Olive brown above; sides of head very dark, with lores black; throat, lower eyelids, and line over eye, pale buff. Abdomen, bright sulphur yellow; white spot at base of primaries prominent. **FEMALE.** Wings and throat as in the same sex in autumn, but brownish above and more buffy below.

DIMENSIONS. Length, 5.00; stretch, 7.96; wing, 2.24; tail, 2.02; bill, .40; tarsus, .73.

COMPARISONS. This is the only New England Warbler which is blue, black and white; thus the male is distinguished. The female is quite different, but may be recognized by the white patch on wing, but this is not always readily seen, then she may be known by the peculiar, grayish green back, no other of our warblers being of just this color, and the fact that there is no wing band. Young males always have the wing spot prominent and this will serve for their identification.

NESTS AND EGGS. Nests usually placed in bushes in evergreen woods, composed of strips of bark, grasses and roots, lined with fine rootlets and hair. Eggs, four to five in number, oval in form, buffy white in color, spotted and blotched with brown and blue of varying shades. Dimensions, .61 by .47 to .65 by .50.

GENERAL HABITS. During migration through Massachusetts, the Black-throated Blue Warbler occurs in almost all kinds of woodlands, but with a preference for swampy thickets. When here it also keeps near the ground. When in Northern New England in its summer home, it keeps well up in the tops of the evergreen trees.

In winter and in spring when in the Bahamas, it frequents low shrubbery and is often seen feeding on the ground, and this is somewhat true of the females in Massachusetts.

BREEDING HABITS. In Northern New England where a greater portion of the species find a summer home, the nest is always placed in a low evergreen in open evergreen woods, but when it breeds in the mountains of Virginia and North Carolina as it does sparingly, it usually chooses a laurel in which to place its nest.

SONG. Looking through my note book I find that way back in the early seventies, I found that there was a resemblance in the song of the Black-throated Blue Warbler to that of the Golden-winged Warbler. Now I know that it is the tone that is similar; the notes are different. They are not quite as lisping nor as hurriedly given as are those of the Golden-wing.

The lay, must, however, be classed among the quaint warbler songs, but is characteristic enough to be recognizable when once heard. The syllables sometimes used to express this song are, "zwee-zwee-zwee," or "che-wee che-wee-wee-see zwee."

MIGRATION AND BREEDING RANGE. Breeds commonly in Northern New England and in Berkshire County, Massachusetts. Rather sparingly and locally in Northern Con-

necticut and Northern Central Massachusetts, also along the mountain ranges as far south as North Carolina.

Migrates south in early September. I found them common at Watson town, September third, 1875, and they continued common for about three weeks, then gradually disappeared, but I saw a single specimen as late as October tenth.

I obtained a single male on Key West, Florida, November twenty-fourth, 1868. On November fifteenth, 1887, I saw a single female at Nassau, Bahamas. I found a few on Inagua in early February, 1880, and obtained a single male at Nassau, February twenty-first, 1897. Thus I do not think that many pass the winter on the Bahamas. They are reported from the Greater Antilles and Guatemala at this season. On their way north they pass the Bahamas in great numbers scatteringly in early April, and increasing in numbers towards the last of the month. Thus I saw them in large numbers between the twenty-fifth and twenty-seventh on South Andros in 1882. They were quite common on Eleuthera, May second, 1897, and that year remained up to the tenth of the month at Nassau. I have found them migrating through Middle Florida in large numbers April 24. I found them at Williamsport, Pennsylvania on May ninth, 1876, and as seen, they reach Massachusetts a little later in the month. (See appendix).

YELLOW-RUMPED WARBLER.

Dendroica coronata.

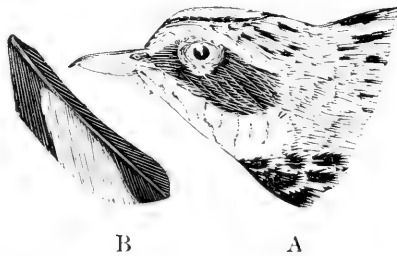
Plate II, Fig. 1, male; Fig. 2, female.

Ashy above, streaked with black. Top of head and cheeks, black. Patch on crown, rump, and one on either side, bright yellow. Throat and lower parts, white broadly streaked across breast and along sides with black. Migrates through Southern to breed in Northern New England. In spring, from the last week in April until the middle of May.

when they are usually found in woodlands. In autumn, from the last week in September until the last of October, at which time they are more uniformly distributed, often being found in orchards. Very abundant.

MALE. Bluish ash above streaked with black. Crown and cheeks black, with a central patch of clear yellow on crown. Patch on rump yellow. Wings and tail dark brown, with the feathers of both edged with ashy. Wing bands white, and three, or sometimes four, outer tail feathers are spotted with white on inner webs, the spots diminishing in size from the outer to the inner. (For form of the spot on outer feathers, see fig. 25, B.) Throat and remaining under parts white, broadly streaked across breast and along sides with black.

FIG. 25.



Yellow-rumped Warbler. A, head; B, outer tail feather of male.

FEMALE. Similar, but with all the markings less conspicuous, and there is a brownish overwashing on the back.

Autumnal males resemble the spring females in having the back overwashed with brownish, but the markings, especially the yellow, are more conspicuous. Females in autumn are browner and duller than in spring.

YOUNG of both sexes are very dull; this is noticeably so in the female, in which the brown above usually conceals all markings, while there is a buff tinging below, with nearly obsolete streaks of dusky only.

NESTLINGS of both sexes with the body above and below reddish, streaked with black, but the wings and tail are like the young in autumn. Usually there is no yellow whatever in this stage, but occasionally the rump patch appears.

DIMENSIONS. Length, 5.50; stretch, 8.70; wing, 3.00; tail, 2.75; bill, .40; tarsus, .70.

COMPARISONS. Known at once, excepting in the nestling plumage, by the yellow rump, white throat, and dark colors. The nearest allied species is Audubon's Warbler, but this has the throat yellow, not white, less black on head and more white on wing.

NESTS AND EGGS. Nests usually placed in low evergreen trees, composed of small twigs and rootlets, lined with feathers and horse hair. Eggs, four in number, ashy white in color, generally with a partly confluent ring of spots around the larger end, of brown, umber, and lilac, and the remainder of the surface is more sparingly marked with pale brown.

GENERAL HABITS. In spring the Yellow-rump Warblers, or, as they are often inappropriately called, Myrtle Warblers, are to be looked for in groves of deciduous trees, especially in swampy localities. They come early among the first of the warblers, and the reason for this early appearance can be seen by studying their winter range. Many of them have never, in fact, been far away. In moving about through the naked branches of the trees, these little warblers feed both among the topmost branches or again descend almost to the ground.

In autumn when they move in straggling flocks they occur everywhere, in woodlands, low thickets, and orchards. Although lively little birds, they are not especially restless, at least when compared with some other members of the family. Although they usually feed upon insects, I found them feeding upon the berry-like fruit of a species of palm near Nassau, Bahamas.

BREEDING HABITS. In its summer home in Northern New England, the Yellow-rump appears to prefer low evergreens, and place its nests in them, often not more than three or four feet from the ground. The feather-lined nest is peculiar for a warbler, and is thus easily recognized. As stated, the usual habit is to build low, but I once found the nest of a Yellow-rump, containing five small young in a spruce twenty feet from the ground. This was on July twenty-second, an exceptionally late time for the young to be in the nest, the usual time for depositing the eggs being the first or second week in June, and by the middle of July all the fledglings have left the nest.

MIGRATION AND BREEDING RANGE. Its winter range appears to be extending northward year by year. It is now

found all winter in the towns of Leominster, Arlington and Quincy, Massachusetts; from this point probably southward throughout Cape Cod, and along the coast northward at intervals as far as Scarborough, Maine. It occurs regularly from Southern Connecticut southward as far as Florida, on the Bahamas, and other West Indies, through Mexico to Panama.

It migrates southward late, some occurring in Central Maine until about the middle of October.

SONG. While migrating, the Yellow-rumps give a rather soft chirp, and when alarmed a louder note. The song is a rather low and somewhat varied warble that is quite pleasing. It is usually rather short, consisting of four or five notes. In autumn the young occasionally give a sweet, low practicing song, similar to that uttered by other young birds.

AUDUBON'S WARBLER.

Dendroica auduboni.

Plate II, Fig. 3, male; Fig. 4, female.

Size, 5.50 to 5.75. Similar to the Yellow-rumped Warbler, but differs in having the throat yellow instead of white, and in having little or no black on head, while the white on the wing is more extended. Accidental in Massachusetts. Occurs in Western North America.

Differs from the Yellow-rump in having a yellow throat, little or no black on head, no white superciliary stripe. Narrow lines of black on back, but the white on wing is more extended.

With exceptions given above, the different stages of plumage appear to be similar to those of the Yellow-rump.

DIMENSIONS. Length, 5.60; stretch, 9.00; wing, 2.90; tail, 2.40; bill, .40; tarsus, .72.

NESTS AND EGGS. Nests composed of strips of fine bark, pine needles, hempen fibers of plants etc., lined with rootlets, hair, and a few feathers.

EGGS, four in number, creamy white, thickly spotted and dotted with brown, of varying shades, and lilac. Dimensions, .68 by .52.

GENERAL HABITS. Audubon's Warbler does not appear to differ in habits from the Yellow-rump, which it so closely resembles in general coloration. Of the song I know nothing, as I have never met with this species living.

MIGRATION AND BREEDING RANGE. Breeds in the mountainous regions of the United States, and northward into British Columbia. Migrates southward in October, to winter in Southern Arizona and California and southward to Guatemala. Its claims to a place in the fauna of New England rests upon a single specimen which was taken in Watertown, Massachusetts, November fifteenth, 1876. It has also been recorded from Pennsylvania.

BLACK AND YELLOW WARBLER.

Dendroica maculosa.

Plate II, Fig. 5, male; Fig. 6, female.

Size, 4.75 to 5.10. Beneath, bright yellow, heavily streaked on lower parts of the throat and along sides with black. Top of head, slaty blue. Back and patch on side of head, black.

Migrates through Southern, to breed in Northern New England. Rather uncommon in Eastern Massachusetts.

MALE. Top of head, slaty blue. Back, patch on sides of head, including a narrow frontal line, upper tail coverts and tail, black, the latter having a band of spots across the terminal third of the inner webs of all but the two middle feathers. Beneath, bright yellow, with the lower part of the throat, sides and flanks, broadly streaked with black. Abdomen, under tail coverts, stripe over eye, spot on under eyelid, and wing bands, white.

FEMALE. Similar to the male, but duller, and the black is obscured with greenish.

YOUNG. Brownish above. Beneath, pale yellow, obscurely streaked with dusky, much as in the adult.

DIMENSIONS. Length, 4.97; stretch, 7.55; wing, 2.35; tail, 1.90; bill, .35; tarsus, .90.

COMPARISONS. Known in all stages by the singular band of spots on tail feathers. The spots are comparatively small, but are remarkable in beginning nearer the base than in any other warbler, and in extending over four or five instead of two or three feathers on either side. (See Fig. 23, C.)

NESTS AND EGGS. Nests placed in low evergreens, composed of twigs, weeds, and dried grass, not very compactly interwoven; lined with black fibrous roots and horse hair. Eggs, four or five in number, ashy white in color, spotted somewhat irregularly and coarsely with brown and lilac. The spots are frequently confluent around the large end. Dimensions, .62 by .52.

GENERAL HABITS. While migrating, the Black and Yellow Warbler appears to prefer deciduous trees. Although they sometimes feed among the lower branches, they are apt to keep well up among the topmost boughs. In their northern home they live mostly among the evergreen trees. The Black and Yellow Warblers have little to distinguish them in habit from many other members of the genus.

BREEDING HABITS. Nests of the Black and Yellow Warbler, which I have found, have all been placed in low evergreen trees, in open places, sometimes by a road side, often not over two or three feet from the ground. The eggs appear to be laid the second week in June.

SONG. The alarm note of the Black and Yellow Warbler is not loud. The song is rather short and resembles somewhat that of the Canadian Flycatching Warbler. It is rather sweet and pleasing.

MIGRATION AND BREEDING RANGE. The Black and Yellow Warblers appeared on May eleventh, 1876, at Williamsport, Pennsylvania, and they were abundant the next day. They arrive in Massachusetts late, not often earlier than the fifteenth of May, and I have found them here as late as the twenty-seventh of this month.

On the southward migration they pass Massachusetts the last week in August or during the first few days of September. I found them common at Watsontown, Pennsylvania from September third until the sixteenth of the month in company with other migrating warblers, and a few remained until the thirtieth. This was in 1875.

Although Dr. Bryant records finding the Black and Yellow Warbler "as abundant as in the United States" on the Bahamas, in the spring of 1859, some being found as early as the fifteenth of March, I have never met with a specimen there, nor have I ever seen it in Florida, but it is recorded from there. The usual winter home of this species is in Eastern Mexico, south to Panama.

The breeding range is in Northern New England, Northern New York, the mountains of western Massachusetts and in the Alleghanies to Pennsylvania.

CERULEAN WARBLER.

Dendroica caerulea.

Plate III, Fig. 1, male; Fig. 2, female.

Size 4.00 to 4.75. Bright blue above; white beneath, with a more or less distinct bluish band across breast. Two distinct white wing bands. Rare in Rhode Island and Connecticut.

MALE. Bright blue above, darkest on head, narrowly streaked on back with black. There is a light superciliary line extending down on neck behind. Wings and tail dusky, the former named, with two distinct white wing bands, and the latter has a spot of white on inner web of all but the two central tail feathers. White beneath, with a more or less distinct band of bluish across breast, and with streakings of same on sides. Sides of head dusky.

FEMALE. Greenish blue, brightest on top of the head. Pale greenish yellow beneath, indistinctly streaked with dusky on sides. Eyelids and superciliary line and wing bands greenish white.

YOUNG of both sexes similar to the adult female, but males, are white beneath and females dull green above, and light buffy yellow beneath.

ADULTS IN AUTUMN do not differ from the spring dress.

DIMENSIONS. Length, 4.80; stretch, 7.90; wing, 2.60; tail, 1.75; bill, .35; tarsus, .60.

COMPARISONS. Known from all our other warblers by the bluish or greenish colors above, white beneath, small size, and white wing bands, and spots on tail extending over all but central tail feathers.

NESTS AND EGGS. Nests, saddled upon horizontal limbs in woodlands, from fifteen to sixty feet above the ground, composed of fine grasses, mosses, hempen fibers of plants, bits of hornet's nests, and sometimes covered with lichens, all bound on with cobwebs. Eggs, three or four in number, creamy or greenish white, sprinkled with reddish brown and lilac, which sometimes combine and form a ring around the larger end. Dimensions, .45 by .48.

GENERAL HABITS. This beautiful little warbler appears to frequent deciduous forests, evidently preferring heavy growths of woodlands, but the only time that I ever saw a specimen living, was at Williamsport, Pennsylvania, May twenty-second, 1876, in a low growth of trees along the Alleghany mountains. It was moving actively about.

BREEDING HABITS. This warbler places its nest high, and saddles it upon the horizontal branch of a tree, much after the fashion practiced by the Wood Pewee, and as it often covers the outside with lichens, the nest quite closely resembles that of the Flycatcher.

SONG. Authorities appear to differ as to the song. Goss, in his *Birds of Kansas*, says the song is "rather a feeble effort, but clear, soft, and musical, ending in a creaky manner." Mr. Brewster, in *Minot's Birds of New England* says, "The song is a guttural trill, much like that of the Blue Yellow-backed Warbler, and, hence possessing about an equal degree of musical (?) merit."

MIGRATION AND BREEDING RANGE. The Cerulean Warblers migrate southward to their winter quarters, which extend from South-eastern Mexico, south to Peru and Bolivia, in September. They come north late in May.

The breeding range is from the Middle States, west of the Alleghanies northward to Minnesota in the west, and to Pennsylvania and New York in the east, stragglers occasionally reaching Rhode Island and Connecticut at this season.

CHESTNUT-SIDED WARBLER.

Dendroica pennsylvanica.

Plate III, Fig. 3, male; Fig. 4, female.

Size 5.00 to 5.25. White beneath, with sides broadly streaked with chestnut. Top of head, clear yellow. Back, greenish, streaked with black. Wing bands, greenish. Common, summer resident throughout New England.

MALE. Greenish above, broadly streaked on back with black. Wing bands greenish. Spots on three outer tail feathers, of the form given in Fig. 26, A. White beneath, and on sides of head, broadly streaked on sides with chestnut. There is a triangular patch of black in front of eye, extending down on neck, and a line of the same color extending from this over the eye. Crown, yellow.

FEMALE. Green above, with black markings duller or absent. The chestnut is confined to the sides of the breast, or is absent.

YOUNG. In males there is little or no black above, and little chestnut beneath. Females are often greenish above and white beneath with no markings, but the wing bands are always greenish.

DIMENSIONS. Length, 5.10; stretch, 8.10; wing, 2.45; tail, 1.95; bill, .38; tarsus, .75.

COMPARISONS. Known in the adult stage by the chestnut sides and yellow crown. In all other stages, by the greenish upper parts, white under portions, and greenish wing bands.

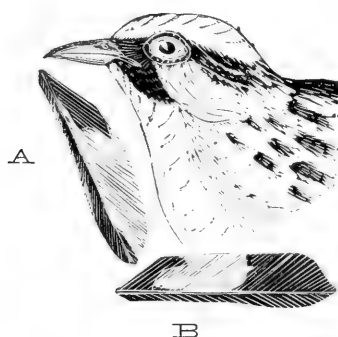
NESTS AND EGGS. Nests placed in bushes, composed of the hempen fibers of plants, fern moss, weed stalks, etc., lined with finer material. Eggs, four or five, white, spotted and blotched with brown of varying shades and lilac. Dimensions, .60 by .45.

GENERAL HABITS. In Massachusetts, the Chestnut-sided Warbler is usually found in summer, in swampy

thickets, but during migrations often wanders into low woodlands, but prefers deciduous trees. They are active little warblers, moving briskly about among the foliage in search of insects.

BREEDING HABITS. The nests of the Chestnut-sided Warblers are usually built the last week in May, and the eggs are laid by the first of June. As a rule, I know few birds which are so sensitive as are these warblers in regard to their nests. They will usually desert a nest, even if quite finished, if they perceive an intruder near it. Upon occasions, I have simply looked at the nest, not only without touching it, but from a few yards distant, yet when I returned a few days after, the nest was abandoned. In spite of this experience, however, Mr. Lawrence Mayo tells me that a Chestnut-sided Warbler built within a short distance of his house, and that both

FIG. 26.



Head of Chestnut-sided Warbler; A, outer tail feather of same; B, outer tail feather of Black and Yellow Warbler.

he and his boys constantly visited the nest, yet the birds raised their young, and were apparently without fear of the visitors. Undoubtedly in this case, the birds became accustomed to the sight of the members of Mr. Mayo's family before they began to build, hence they were not alarmed when the nest was approached.

SONG. To my ear, the song of the Chestnut-sided Warbler is quite similar to the first part of that of the Yellow Warbler, but it terminates differently, or perhaps a few additional notes are added. This is the usual song and is quite pleasing. They have all the characteristic calls and alarm notes of other allied warblers.

MIGRATION AND BREEDING RANGE. The Chestnut-sided Warblers arrive from the south the first week in May or a little later. They scatter all over New England, but are rather more numerous in the southern and middle sections, than in the northern portion. At this season they occur as far south as Northern New Jersey.

They depart for the south the last week in August, being one of the earliest warblers to leave New England.

Winters from Eastern Mexico southward to Panama. Dr. Bryant records having seen a few in the Bahamas in the spring of 1856, but I have never seen a specimen there at any season.

BAY-BREASTED WARBLER.

Dendroica castanea.

Plate III, Fig. 5, male: Fig. 6, female.

Size, 5.20 to 5.90. Beneath, buff, with throat, upper breast and sides, bay or dark chestnut. Greenish buff above, streaked with black.

MALE. Greenish buff above, streaked with black on back. Spot on sides of neck, buff. Top of head, dark chestnut. Broad band across forehead and on sides of head, black. Wing bands, white. White spots on tail confined to two outer feathers, the form of which is given in fig. 27 A. Beneath, including under tail coverts, buff, with throat and broad line on sides, bay.

FEMALE. Olive above, streaked with dusky. Crown, sometimes tinged with chestnut. Beneath, buffy, usually with some trace of bay on head and sides.

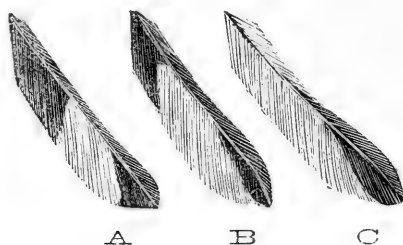
ADULT MALES IN AUTUMN. Similar to the females, but rather more bay beneath.

YOUNG IN AUTUMN. Similar to the female, but the male has little bay beneath, and the female often none at all.

DIMENSIONS. Length, 5.60; stretch, 9.00; wing, 2.80; tail, 2.15; bill, .42; tarsus, .90.

COMPARISONS. Known in the adult stage by the chestnut crown, and bay beneath. Young birds and females are quite similar to those of the

FIG. 27.



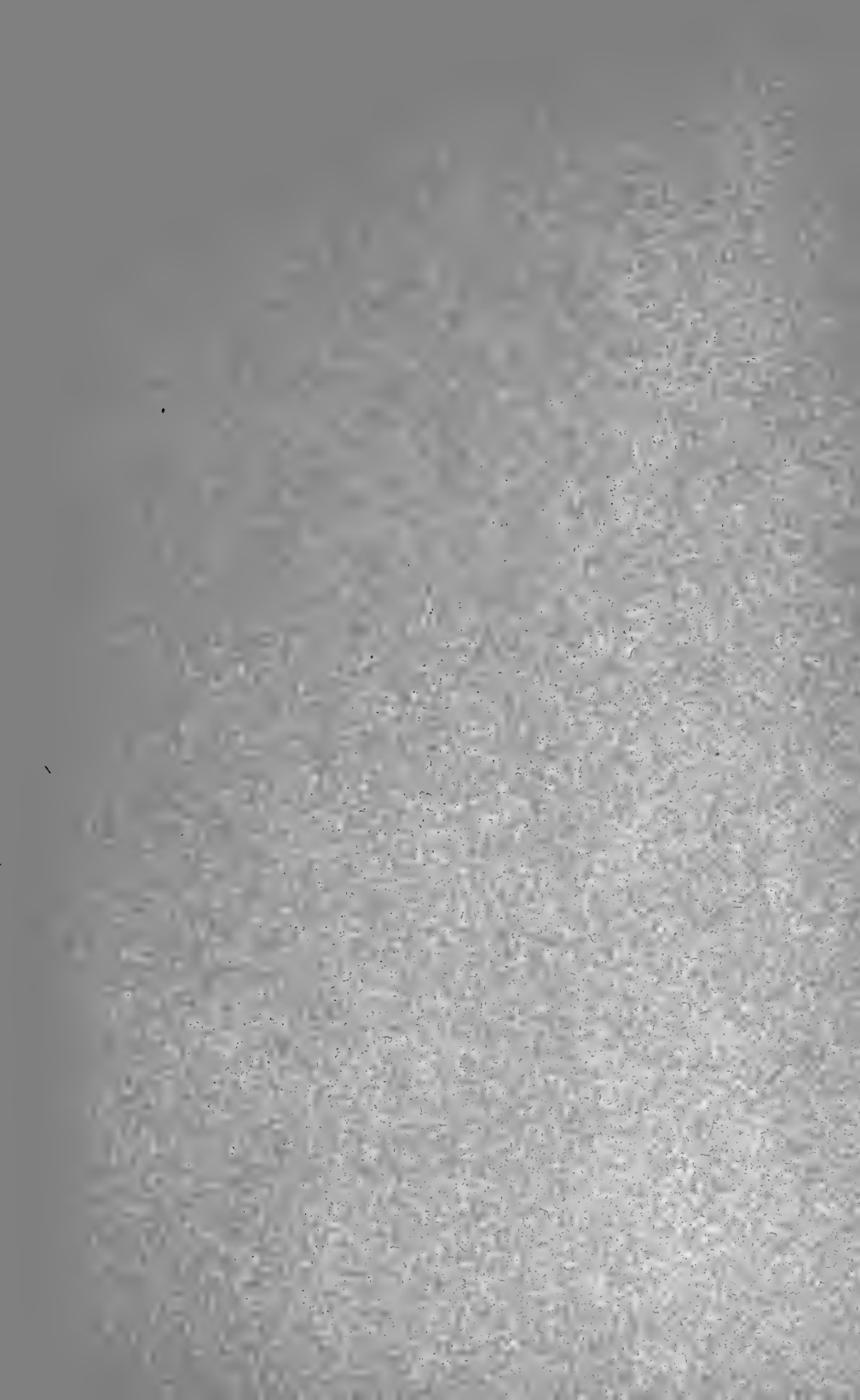
Tail feathers of Warblers: A, Bay-breasted; B, Yellow-throated; C, Blackburnian.

Black-poll, in the same plumage, but may always be distinguished, even when there is no trace of bay beneath, by the buff under tail coverts, those in the Black-poll in all stages being white.

NESTS AND EGGS. Nests placed on horizontal branches of evergreen trees at a considerable elevation above the ground, composed of fine dead larch twigs and long moss, lined with fibrous roots, moss and hair. Eggs, four to six in number, pale bluish green in color, spotted and blotched with brown over the entire surface, the spots often becoming confluent on the larger end, forming a ring.

GENERAL HABITS. The Bay-breasted Warbler is a rather rare migrant through Eastern Massachusetts, and although I found it exceedingly common in the region about Lake Umbagog in 1871, Mr. Brewster tells me that it nearly deserted this section between 1875 and 1879.

While migrating, the Bay-breasts often frequent hemlocks, but are occasionally found in other trees. They are not especially active warblers, being quite similar to the Black-polls in this respect.





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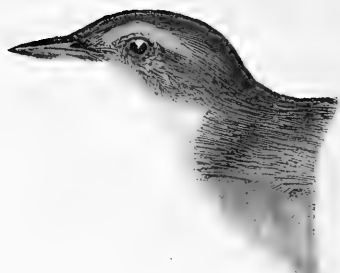
1901



PLATE III.



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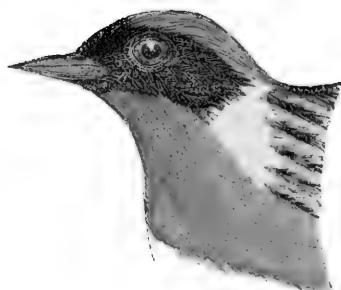
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EXPLANATION OF PLATE III.

Cerulean Warbler, 1, male, 2, female.

Chestnut-sided " 3, " 4, "

Bay-breasted " 5, " 6, "



PLATE III.



1



2



3



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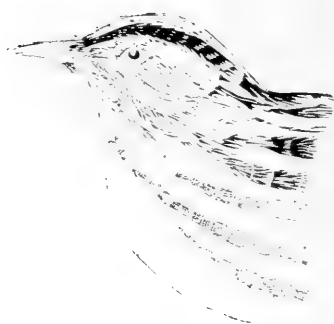


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PLATE I.



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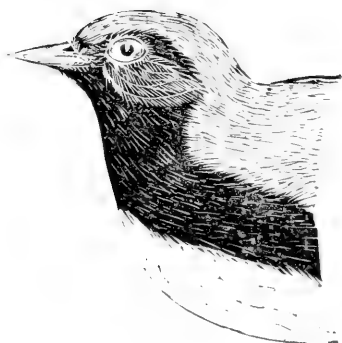
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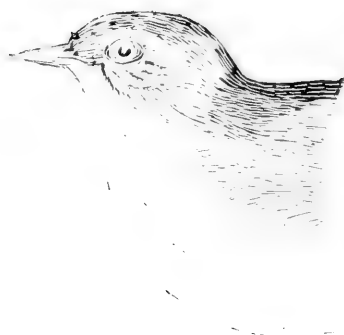
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PLATE II.



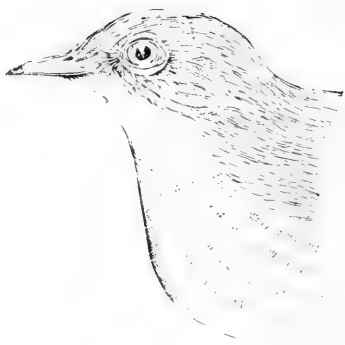
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BREEDING HABITS. While walking along a wood road, near Lake Umbagog, on June 3, 1871, I saw a female Bay-breasted Warbler fly into a hemlock which stood near the road, and alight on a nest; the first known to science of this species. This nest was placed on an horizontal branch of the tree about twenty feet from the ground, and a few days later Mr. Brewster discovered another nest in a similar situation. This appears to be the usual method of building. Mr. Brewster says that but few of these warblers now breed about Umbagog, where he, Mr. Ruthven Deane and myself found them so abundant thirty years ago.

SONG. The first part of the song resembles the lisp of the Black-poll, but this is followed by a terminal warble that is similar to the song of the Redstart, but is given with less energy. The alarm note, uttered both spring and fall, is a sharp chirp, similar to that of the Black-poll.

MIGRATION AND BREEDING RANGE. The Bay-breasts breed from Northern New England north to Hudson Bay. Their winter quarters are from Guatemala to Columbia. In passing northward, the majority of this species usually avoid eastern New England, and pass up the Connecticut Valley to their summer home; thus, as a rule, the Bay-breasts which appear in Eastern Massachusetts in spring are stragglers from the main body. The spring migration is late; the birds appearing here from the tenth to the last of May. At Watertown, Pennsylvania, I saw the first specimen on May 15, but the birds were not common until four or five days later. In the spring of 1900, when many species of birds, the majority of which usually pass to the westward of us, were forced into Eastern Massachusetts by extreme cold weather in the west, and held here by equally cold weather in the north, these warblers were not uncommon as early as May 11.

In autumn the Bay-breasts are rather more common than in spring, but at that time, through their close resemblance to the Black-polls, are apt to be overlooked. This year (1901)

I saw my first specimen in Waltham on September 14, then again in Belmont on the 21. In the autumn of 1875 I found them common at Watsontown, Pennsylvania, on September 3, at which time the main flight occurred, then they continued to appear in constantly decreasing numbers until the last of the month. In the autumn, the Bay-breasts associate with the Black-polls and other migrating warblers, thus frequenting birches and other deciduous trees.

BLACK-POLLED WARBLER.

Dendroica striata.

Plate IV, Fig. 1, male; Fig. 2, female.

Size, 5.35 to 5.75. Black and white in stripes; top of the head, solid black; back, grayish. In autumn, greenish, streaked with dusky above and below. Migrates through most of New England to breed in the north. Common in spring, abundant in autumn.

MALE. Grayish above, white beneath, with a narrow white collar extending around neck. Streaked above, on sides of throat and along sides with black. Top of head, solid black. Wing bars, white.

FEMALE. Greenish above, greenish-white beneath, streaked above and on sides with dusky. No black crown patch. Wing bars, white.

ADULT MALE IN AUTUMN. Similar to the spring female but rather more greenish beneath.

ADULT FEMALE IN AUTUMN. Greener than in spring with fewer streaks.

YOUNG OF BOTH SEXES IN AUTUMN. Very greenish above and below, with a few streakings above and with faint, dusky markings below. The wing bars in all stages are more or less tinged with greenish, but in the young they are quite greenish, and the feathers of the under tail coverts are slightly tipped with it.

NESTLINGS. Similar to the young, but each feather has a central spot of dusky.

DIMENSIONS. Length, 5.41; stretch, 8.85; wing, 2.60; tail, 2.02; bill, .51; tarsus, .60.

COMPARISONS. The adult male somewhat resembles the Black and White Creeper, but differs in having the crown wholly black and the back grayish. See Comparisons on page 10 and figs. 19 and 20. The adult stage of both sexes may be known from the corresponding stages in the Bay-breasts by the absence of any bay beneath, but in the autumnal plumages, especially in the young, the resemblance between these two species is very close. Autumnal Black-polls are seldom as pale as Bay-breasts, and the latter named species always has the flanks and under tail coverts tinged with buff, but this is very pale in the young. The upper outline of the white spot on the tail of the Bay-breast crosses the web of the feather more nearly at right angles than in the Black-poll in which this outline is more oblique. Compare fig.

FIG. 28.



Black-poll Warbler, head and outer tail feather.

The Black-poll Warbler in fall plumage, and probably also the young of the Bay-breasted, were considered by Alexander Wilson as a distinct species, which he called the Autumnal Warbler.

NESTS AND EGGS. Nests placed in trees, usually evergreens, composed of small twigs and grasses, lined with black, hair-like lichens. Eggs, four in number, oval in form, white, spotted and dotted with lilac and umber, usually with the markings more confluent on the larger end.

GENERAL HABITS. With the blooming of the apple trees, usually the second week in May, come the Black-polls. At this season, although often found in the woodlands, especially of late years, these birds appear to prefer the more open sections, and thus often frequent orchards. Their movements at this season are rather more deliberate than are those of many of the warblers. The coming of these warblers is never very welcome, for their advent announces that the migrating season, so full of delightful avian surprises, is fast drawing to a close. In autumn, when the Black polls are in their green,

27 A, with fig. 28. Pale warblers in autumn, associating with Black-polls, should be examined with care for traces of buff or bay.

Young Black-polls also resemble the females of the Cape May and Pine Warblers, but neither of these are at all streaked above, while the former named is more heavily streaked below; neither in any stage have greenish wing bars.

protective livery, and are exceedingly abundant, they do not visit the orchards as often as in spring, but frequent the low gray birches, evidently being attracted to them by the large numbers of green plant lice which then infest these trees.

BREEDING HABITS. I found the Black-poll'd Warblers breeding very commonly in the thick forests of stunted evergreen trees on the wind-swept Magdalen Islands. These trees, probably from the effects of some parasite, have numerous bunches of closely growing foliage scattered through them much as seen in some of our red cedars. These bunches often resemble the nests of birds so closely that it is difficult to distinguish the difference between them without close examination; thus, there, the domicile of this warbler is not easy to find. The nest is, however, placed on the limb of a tree close to the trunk. The eggs are laid during the latter part of June, and by the first of August the young are fully fledged.

SONG. The alarm notes of the Black polls are usually a sharp, rather prolonged chirp. This serves to distinguish them in the fall from the Yellow-rumps, the notes of which are softer and shorter. In spring, however, the Black-polls utter a short chirp in addition to the usual note. The ordinary spring song is a series of lisping notes which may be expressed by the syllables "zee zee zee zee" given in a monotonous tone. They also utter a series of notes which somewhat resemble those of the Pine Warbler, but which are shorter and less musical: there are still other song notes, a short "*chuck*" repeated three or four times. I heard the regular spring song given twice on September 8 of this year (1901).

MIGRATION AND BREEDING RANGE. Breeds in the elevated portion of northern New England, on Grand Menan, and northward. The Blackpolls begin to appear in Massachusetts from the north, about the first week in September in small numbers, but increase until October 1, then gradually decrease, but do not wholly disappear until after the middle of

the month, I saw a few at Fairhaven, Massachusetts, on October 18, 1900, and on the 24 they were common along the Raritan and Delaware Canal, in New Jersey, but I did not see them further south a few days later. They winter in South America.

SPECIAL NOTES ON THE NORTHERN MIGRATION. The northward migration of this warbler, as I have traced it, is exceedingly interesting. While sailing down the coast of Andros Island, Bahamas, about eight o'clock in the morning of April 27, 1884, from Deep Creek, when some five miles from land, off High Point, we began to observe flocks of warblers. They were mostly Black-polls, and consisted of from three or four individuals to a hundred, or even more. Some flew close to the surface of the water, but the usual height was about ten feet from it; none were over twenty feet high. The birds were coming from a south-easterly direction, and the flocks appeared at quite frequent intervals. As the day advanced these flights increased in numbers, and when we landed in the afternoon on some small keys, near the south end of Andros, we found them covered with warblers, mostly Black-polls, which were then constantly arriving and departing. The night before this large flight we had thunder showers, and in the morning a light wind from the north which shortly increased, and by two o'clock in the afternoon was blowing a stiff breeze. The next day the flight continued with the Black-polls as abundant as they were the day before; the number seen being very great, and consisted of both sexes. On the third day, April 29, there were a few only remaining on the key; the flight was over, having lasted two days.

On April 20, 1893, I saw a single male Black-poll on the island of Eleuthera, a little more than a hundred miles north of the point on Andros where the foregoing observations were made, and, what is more note-worthy in the present case, some fifty miles to the eastward. Black-polls were abundant there by the second of May, and these were mostly males. On May 5 they were common on Salt and Athel's Keys, just north of New Providence, and on May 6 were abundant about Nassau.

The only Florida record of my own that I can find for the Black-poll is of a single specimen, taken at Miami, on April 16, 1871, which must have been a straggler, as the date was exceptionally early.

Black-polls arrive in Massachusetts about May 10, are common by the 15, and stragglers are found at least as late as June 10. They arrive on their breeding grounds from June 5 to 15.

With the above data in hand, it is possible to trace this species of warbler from its winter resort to its northern breeding ground, and give the approximate

time of migration. The route of migration is doubtless directly north from the coast of South America to Jamaica, where the species is a well-known migrant, across eastern Cuba to the Bahamas. When I saw them on April 26 they must have recently come from South America, and, judging from the short stay that they made on the keys south of Andros, each individual would not have remained over a day in either Jamaica or Cuba, thus, probably, these birds left the coast of South America on April 23. After crossing the Bahamas the Black-polls no doubt strike the coast of the United States about in the neighborhood of Charleston, South Carolina, and then proceed north quite leisurely. Thus the first portion of the journey of an individual Black-poll from South America to Charleston is made in four or five days, including stops to feed. The remainder of the journey would be made in about fifteen days. Thus the Black-poll Warbler occupies something like twenty days in all, in performing a journey of 2,500 miles.

It is exceedingly difficult to arrive at even an approximate estimate of the numbers of any given species of bird, hence any data that will give even a roughly approximate estimate of such a number are of value. In the case of the Black-poll Warbler, I think some such estimate can be made from my own observations.

First let us try and estimate the area occupied by the whole of this species during migration. The width of the region traversed by the Black-polls from South America to the northern Bahamas is, I should judge, about one hundred miles. That is it would be about as wide as the length of the island of Jamaica. I certainly did not find this species on the Cayman Islands, and, although it is recorded from Porto Rico, it is not given from Hayti nor San Domingo; thus we have good reason for believing that the greater number of the spring migrants of this species pass over Jamaica and so across the eastern portion of Cuba in probably about the same width of belt in which they crossed Jamaica, then on to the Bahamas, extending across the keys about the same distance. It took the flight of Black-polls, as already stated, about two days to pass the keys to the south of Andros. We may thus judge that it took two days for all of the members of this species, after once starting to leave the coast, to get fairly out of South America. By this estimate we find that the entire body of warblers was one hundred miles wide, measured by distance, and two days long, measured by time. Now to try and reduce the time to distance, we will have to consider — as it may perhaps be safe to do — that when the advance guard of the Black-polls reached the keys of Andros, on the morning of April 26, the rear-guard was still in Jamaica, three hundred and eighty miles away; giving a column of Black-poll Warblers three hundred and eighty miles long by one hundred wide. Or, in other words, all of the Black-polls in the world, were, at this time, confined to an area 38,000 square miles. Estimating that each of these square miles, both sea and

land, then contained two thousand birds, and, according to what I saw at that time, this is an under estimate, we should have had the enormous number of 7,600,000 Black-poll'd Warblers living, and on their way north at eight o'clock in the morning of April 23. 1884. I can find no good reason why these numbers should have at all diminished since that time, hence, if that was a fair approximate estimate of their numbers then, it will answer for an approximate estimate today.

BLACKBURNIAN WARBLER.

Dendroica blackburniae.

Plate IV, Fig. 2, male; Fig. 3, female.

Size, 4.75 to 5.30. Throat and upper breast, bright orange. Above, black; conspicuous white spot on wing. Migrates through southern to breed in northern New England. Rather uncommon in eastern Massachusetts.

MALE. Above and on sides of head, black, streaked with yellowish-white on back. Spot on top of head, line over eye, throat and upper breast, bright orange. Remaining under parts, yellowish. Streakings on sides, black. The two wing bars are fused into a white patch. Spot on outer tail feather extending to base. (See fig. 27, c).

FEMALE. Brownish above, with the edges of the feathers dull orange. The orange markings of the male are repeated, but are much paler, and the streakings beneath are dusky. Wing bars, two. Tail spots as in the male.

YOUNG. Similar to the female but rather duller, and the light streakings above are more extended.

DIMENSIONS. Length, 4.75; stretch, 7.75; wing, 2.65; tail, 1.80; bill, .40; tarsus, .70.

COMPARISONS. The adult males may be known by the orange throat and and black back, and in other stages by the resemblance to this.

NESTS AND EGGS. Nests, placed in low evergreens, rather bulky, composed of downy material, moss, etc., lined with feathers, lichens and horse hairs. Eggs, three or four, pale greenish-white, spotted and blotched, usually around the large end, with brown of varying shades and lilac. Dimensions, .45 by .65.

GENERAL HABITS. Although there is scarcely a migrating season in spring, in the neighborhood of Boston, when some Blackburnians are not seen, it is only during exception-

al seasons that they are at all common. I have seen this pretty little warbler quite plentiful here on two or three occasions in my early collecting days, back in the "sixties" but never as numerous as they were on May 10 and 11, 1900. When migrating, the Blackburnians usually prefer woodlands composed of deciduous trees, but in their summer homes they frequent evergreens. They are active warblers, and, as a rule, keep among the upper branches of the trees.

BREEDING HABITS. The favorite nesting grounds of the Blackburnian Warbler are the evergreen forests of the elevated regions of western Massachusetts and northern New England. The nests are usually bulky structures, and are placed on a limb of an evergreen, at a height varying from ten to thirty feet or more. From the situation chosen they are difficult to find, and hence may be classed among the rare nests of warblers.

SONG. The alarm note of this fine warbler is rather low and quite sharp. The song is pleasing, but simple, being without any very marked peculiarity. It consists of a series of six double, lisping notes, which become somewhat squeaky as they advance, and terminate in an ascending scale.

MIGRATION AND BREEDING RANGE. On May 27, 1876, I procured a female Blackburnian at Williamsport, Pennsylvania, that was about to deposit her eggs. This was among the earlier records which indicated a southward breeding tendency of this species along the Alleghanies. From this region they extend northward, and breed commonly in Berkshire, and Worcester counties, Massachusetts, in northern New England, northward to Laborador. They winter from eastern Mexico, south to Peru.

In moving southward the Blackburnians pass Massachusetts during the last week in August and the first week in September. I found them common at Watsontown, Pennsylvania, from August 29 to September 6, and then in gradually decreasing numbers until the 22.

PLATE IV.



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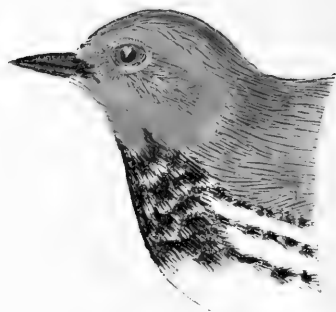
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EXPLANATION OF PLATE IV.

Black-poll'd Warbler, 1, male, 2, female.

Blackburnian " 3. " 4. "

Black-throated Green 5. " 6. "



PLATE IV.



1



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On the northward migration, I found them common at Williamsport, Pennsylvania, May 9, 1876, then in increasing numbers until the 19, when they were abundant, this being the height of the flight. With us, here in eastern Massachusetts, although occasionally found during the first week in May, they do not appear, as a rule, until the second week.

Dr. Henry Bryant records seeing a pair of Blackburnian Warblers in the vicinity of Nassau, on the Bahamas, April 30, 1859, but I have never seen the species there, and consider these islands wholly out of the usual track of migration.

BLACK-THROATED GREEN WARBLER.

Dendroica virens.

Plate IV, Fig. 5, male; Fig. 6, female.

Size, 4.70 to 5.30. Golden green above; white beneath. Throat, black; cheeks, yellow. A common summer resident all over New England.

MALE. Golden, or yellowish green above, with cheeks and line over eye yellow. White beneath, with throat and streaks along sides black. Wing bars, white. Spot on outer tail feather, extending nearly to base (see Fig. 29).

FEMALE. Similar to the male, but with the black beneath not as extended, a portion of the throat being yellow.

YOUNG OF BOTH SEXES. Similar to the female but the black markings below are often even more restricted.

NESTLINGS. Dull orange above, line over eye, sides of head and beneath, yellowish-white; throat, ear coverts and faint lines on sides of breast, dusky,

DIMENSIONS. Length, 5.10; stretch, 7.75; wing, 2.50; tail, 1.85; bill, .45; tarsus, .65.

COMPARISONS. Readily known by the golden green of the back, yellow cheeks and black throat, indications, at least, of which may be seen in all stages, except the nestlings.

NESTS AND EGGS. Nests usually placed in white pines, occasionally in other trees, or even bushes, composed of small twigs, grasses and hempen fibers of plants, lined with downy material. Eggs, four in number, oval in form, white, spotted and blotched over the entire surface with brown and purplish of varying shades. Dimensions, .50 by .70.

GENERAL HABITS. In studying animal life, one of the first lessons which we learn is, that certain species inhabit particular sections of country, avoiding other sections, which are in turn inhabited by other species. Birds offer no exception to this rule, hence we find that the different species of warblers are apt to select certain kinds of woodlands. Thus the Black-thoated Greens are almost always found among white pines, and the larger the trees and more extended the groves, the more are they frequented by these beautiful little warblers. As high white pines usually have thick foliage, in

FIG. 29.



Black-throated Green Warbler,
head and outer tail feather.

the midst of which the Black-throated Greens delight to stay, these warblers may be classed among those birds which are more often heard than seen. Sometimes, however, especially during migration, or when the females are searching for building material, when the males are apt to accompany them, these warblers will descend into low trees, where their trim, slender forms and bright colors may be seen. They are quite active warblers, usually moving quickly from place to place, but like many birds, even the most active, they find time to rest, and then sit perfectly quiet. Their resting time is often during the heat of the day, when the insect larva, which forms the chief portion of their diet, are not feeding. These mid-day si-

estas of the birds are usually taken in the topmost branches of some favorite pine, where even a powerful bird glass will only reveal their forms indistinctly.

BREEDING HABITS. A favorite place for a nesting site with the Black-throated Greens is a branch of a white pine, and the neat little home is often placed on it not far from the trunk, but sometimes among the outer twigs. I have known a barberry bush to be chosen. The nest is built the last week in May, and late in June the young may be seen accompanying their parents.

SONG. The Black-throated Green Warbler has a peculiarly sweet song often consisting of five notes, to which sometimes one or two more notes are added. This song may be well rendered by the words, "*Good Saint The-re-sa*" given with a rising inflection, and with a decided accent on the last syllable of the last word. When notes are added it is to the first portion of the song, thus the first word is repeated with every additional note. One member of my class, thinking the warblers more devoted to nature than to the Saint, hears the bird say, "*Trees, trees, mur-mur-ing trees*". Another pupil thinks the bird more egotistical and hears him constantly reiterate, "*I am the Black-throated Green*". Of course not all of the the members of this species sing alike, possibly, in fact, probably, the young birds, for a year or two, do not sing as well as the adults, hence there is considerable variation in their songs. Then again, in common, as I now think, with all of the warblers, the Black-throated Greens sing an entirely different song in mid-summer from that given earlier in the season. In this case the late song is a much more simple warble, with little or no resemblance in syllables or accent to the spring songs. I have given considerable attention during the past few years to these summer variations in bird songs, and have come to the conclusion that they are due to the gradual weakening of the muscles of the lower larynx (see page 4) this weakening occurring in sympathy with the shrinking of the

reproductive organs and general debilitation preceding the moulting season. As this weakening is gradual, the song is gradually changed. In other words, a summer song is only the effort made by the warbler to produce the ordinary song with an impaired musical apparatus.

Students of bird songs should learn the peculiar intonation with which birds render their notes. This intonation is strongly specific and is less affected by either individual variation, or by the weakening of the singing muscles, than any other quality of the song. Some of my pupils who read this, will remember that I called their attention to this intonation one day, late in July, when listening to the summer song of the Black-throated Green Warbler on Prospect Hill, Waltham.

MIGRATION AND BREEDING RANGE. The Black-throated Greens breed commonly along the Alleghanies from South Carolina northward, all over New England, north to Hudson Bay, and west to Illinois.

On the southward migration the greater portion of these warblers leave Massachusetts the last of September, but some remain until the middle of October.

I have never seen a specimen in Florida, the Bahamas, or in the West Indies. They winter in Central America.

On the northward migration they pass through Pennsylvania during the first week in May, and arrive in Massachusetts about the same time.

PINE WARBLER.

Dendroica vigosii.

Plate V, FIG. 1, male; FIG. 2, female.

Size, 5.43 to 5.70. Greenish above; greenish-yellow beneath, obscurely streaked on the sides of breast with dusky. Wing bars, white. Common in Massachusetts in summer.

MALE. Greenish-olive above; greenish-yellow beneath, obscurely streaked on sides of breast with dusky; dull white on abdomen. Wing bars, two, white. Spot on outer tail feather, pointed oval (see Fig. 30,).

FEMALE. Browner olive above than in the male; dull white beneath, tinged with yellow on throat and breast.

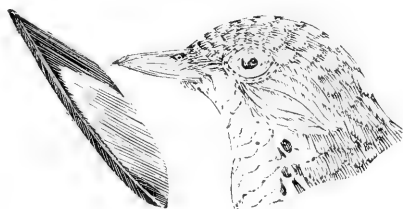
YOUNG MALE, Brighter than the female above and below, but duller than the male.

YOUNG FEMALE. Very brown above, and plain, dull white beneath, either without a trace of yellow below, or only a slight tinging of it.

NESTLINGS. Reddish-brown above; dull white beneath, tinged with reddish on sides of breast.

DIMENSIONS. Length, 5.45; stretch, 8.80; wing, 2.75; tail, 2.10; bill, .45; tarsus, .70.

FIG. 30.



Head and outer tail feather of Pine Warbler.

COMPARISONS. Known by the plain colors, without any streakings above or prominent black markings anywhere. See page 35 for further comparisons.

NESTS AND EGGS. Nests usually placed in pitch pines, composed of small twigs, pine needles, weeds and grass, lined with fine grass and cottony substances. EGGS, four, bluish-white, spotted and dotted with brown and umber, these spots often forming a ring around the large end. Dimensions, .50 by .75.

GENERAL HABITS. On those quiet days, which we sometimes have even in early April, when the sun shines warm on the southern hillsides which are overgrown with pitch pines, the low trills of the Pine Warblers greet the ear, and thus become inseparably associated with the peculiar odor of the fallen pine needles, and the gentle murmur of the west wind through the tree tops. So nearly, however, do the hue of these plainly colored little birds blend with the yellowish-green tints of the foliage that it is difficult to see them. It is

only when they condescend to alight on some low branch, to fly to the ground, or to cling for a moment to the rough bark of their favorite pine, in order to capture some insect, that their plumage can be distinctly seen. I have spent many an hour studying the habits of this warbler, both in New England and in the south. All winter long the vast extents of pine woods in Florida are enlivened by the songs and flitting forms of these warblers. Here they are very restless, sweeping over the wide, park-like pineries in great waves, in company with Bluebirds, Woodpeckers, and other species of warblers. During a few moments many of the trees about one will be filled with hundreds of moving birds, and the air will be resounding with bird notes. Then gradually all will disappear; their songs will die away in the distance, and not a living creature will remain in sight, save, perhaps, a Vulture circling high in air, and not a sound will be heard, save, perchance, the faint cry of an Eagle, coming from some far-away lake, near which he has his nest; the avian wave has rolled past, and an hour or more may go by before another will appear.

With us, here in Massachusetts, the Pine Warblers are more solitary in habit. One or two pairs to each grove of their favorite tree is about the number that we usually find. They still retain, however, some of the restless habits acquired in the south. Before nesting time (with the males even after this) they are seldom quiet, but move about from tree to tree, often in a circular direction, thus constantly return, but at somewhat irregular intervals, to certain places.

Although in spring, especially when migrating, they are sometimes found in deciduous trees, they never go far from the pitch pine groves. In the fall they wander more, and then often associate with other warblers in mixed growths of trees.

BREEDING HABITS. The nest of the Pine Warbler is built about the first week in May. The young of this brood

leave the nest about the middle of June, and are fully fledged and able to care for themselves by the first of July. Another nest is built in early July, and a second brood raised, that is fully fledged in August. This is the only warbler with which I am acquainted, that habitually raises two broods in a season in New England.

The nest of the Pine Warbler is usually placed near the extremity of a branch of a pitch pine, and is somewhat concealed by the needles. The height at which they are placed varies considerably; I have seen them in low trees, not ten feet from the ground, then again on a limb over thirty feet high. When sitting, the female seldom leaves the vicinity of the nest, but the male wanders about considerably. I have known one to fly to a pine grove to feed that was a quarter of a mile from its nesting place.

SONG. The song of the Pine Warbler consists of a series of from five to seven notes, run together, forming a trill, resembling somewhat that of the Chipping Sparrow, but each note is more full, and the whole lay is much more musical. A much nearer resemblance may be found in the trill of some Swamp Sparrows. The Pines have three methods of singing, but always use the same notes, or a portion of them; that is, at times the first three notes of the song are uttered, then at other times the terminal notes are given, then both parts together. I have heard the same bird sing in the three ways in rotation.

On September 1 and 2, 1901, when in company with Mr. Andrew J. Lloyd at his home in Greenwood, Massachusetts, we heard the Pine Warbler sing repeatedly. The song was a little shorter than that uttered in the spring, the notes having more of the character of a warble than a trill.

Autumnal songs of birds are very interesting, and I have come to the conclusion that most birds give them. While it is probably not true that every individual of a given species, even if adult, utters a song after the summer moult, many do.

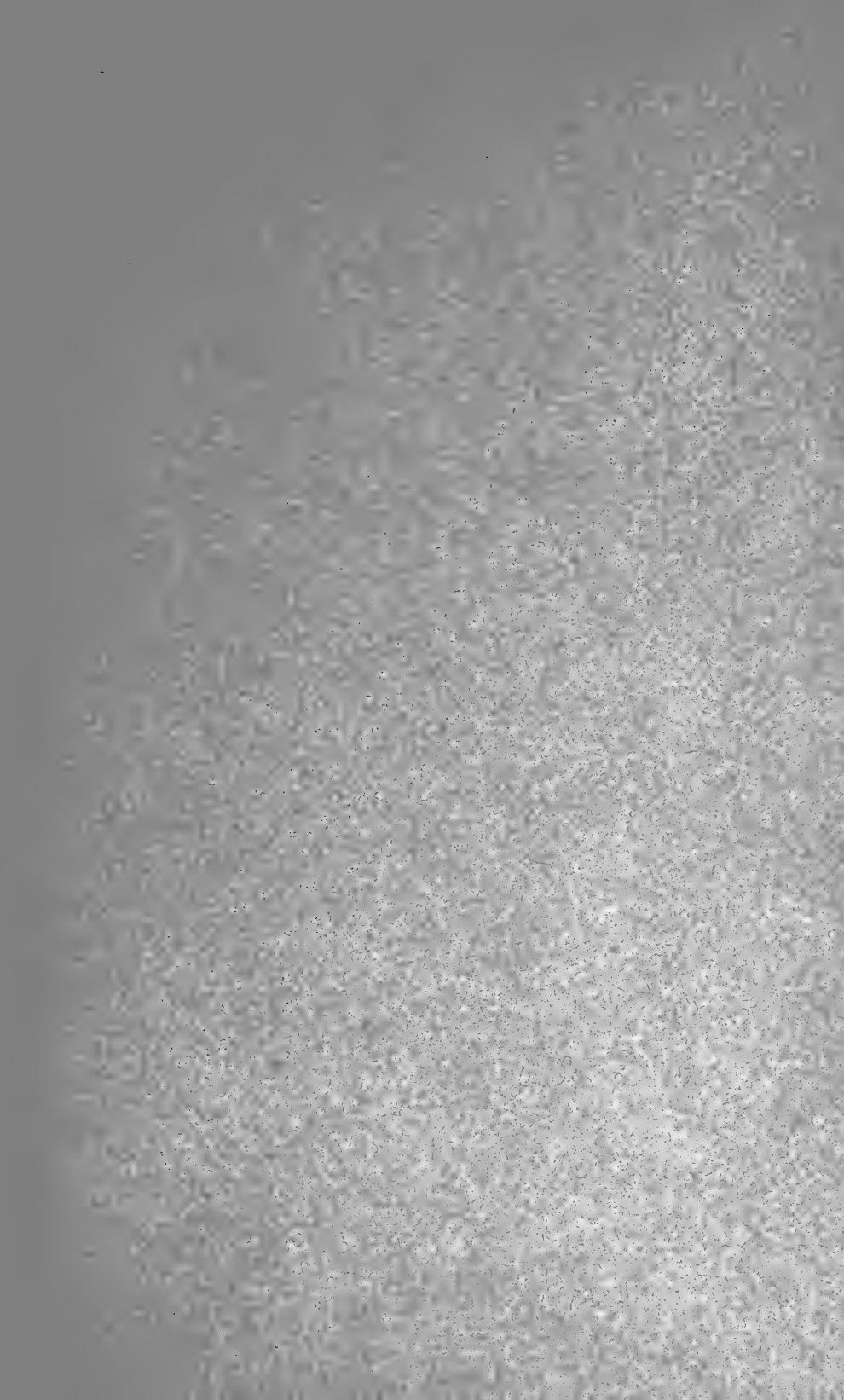
This late song is sometimes given quite as well as in the spring. An Oriole which had lived on my place all summer, and which had such a peculiar song that it was easily recognized, as if the bird said, "*Take me with you? No you don't. No you don't. See!*" gave this song in detail on August 21, 1900, when in the characteristically bright plumage of autumn. Other birds, probably always the young, give either murmuring imitations of the spring song of the adult, as is done by the Song, Swamp, White-throated, and other sparrows, or give fragments of the true song. On August 30, 1901, a young male Rose-breasted Grosbeak alighted on the cupola of my barn and uttered a portion of the regular song, in which was curiously mingled the metallic-like "*click*" which this species uses as an alarm note.

It appears to me, that just after the autumnal moult some birds appear to possess enough unexpended energy to affect the reproductive organs, causing a slight inclination to breed. This inclination is exhibited, not only in the song, but also in some cases, in attempts to mate. I saw some Barn Swallows last August, mostly young, acting nearly like mated birds in the spring.

MIGRATION AND BREEDING RANGE. The Pine Warblers breed throughout Eastern North America, west to the Plains, from Florida to New Brunswick, wherever the different species of pitch or hard pines occur, hence is rarely ever found in the hemlock, spruce and white pine forests of northern New England.

The northward migration occurs early, the birds arriving in Massachusetts from the first to the last week in April, depending upon the weather.

In autumn most of these warblers leave Massachusetts during the last two weeks in September, but stragglers stay later, in fact, a few have been known to remain all winter. I have never found them at this season, however, north of the Carolinas.





Part III.

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THE
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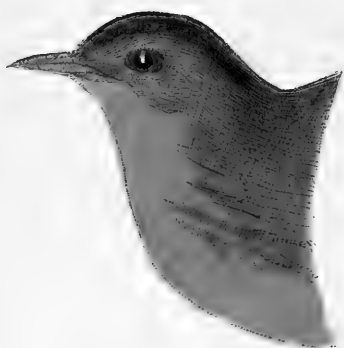
BY
C. J. MAYNARD
ILLUSTRATED

No. 17

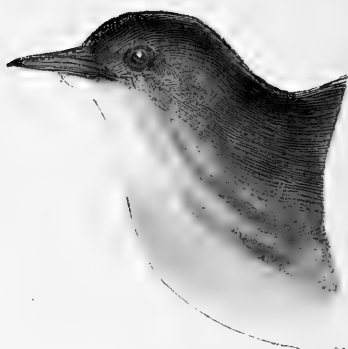
WEST NEWTON
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1901



PLATE V.



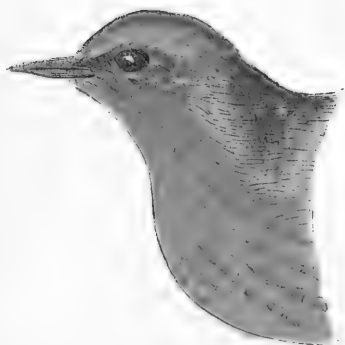
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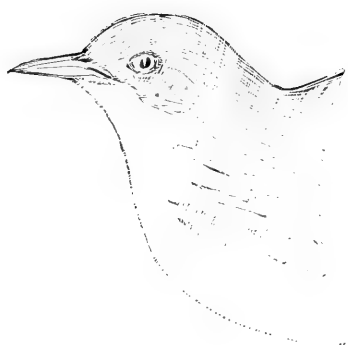
EXPLANATION OF PLATE V.

Pine Warbler, 1, male, 2, female.

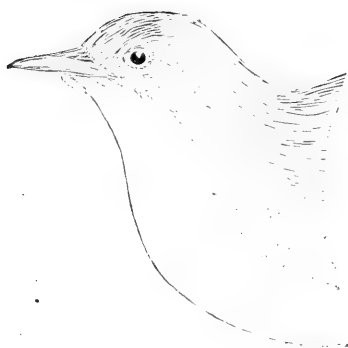
Prairie " 3, " 4, "

Yellow Red-poll, 5, " 6, " in autumn.

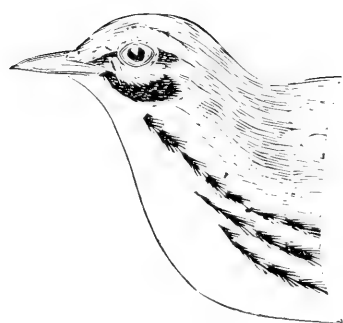
PLATE V.



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The Pine Warblers are always very common in the extensive pine woodlands of Cape Cod, but during the past summer (1902) they were particularly abundant at my place, Camp Metacomet, in the town of Barnstable, outnumbering every other species of warbler. In fact, there was scarcely a moment during the day, when one was in the pine woods, that the song of one or more could not be heard. There is considerable variation in the songs. Some individuals sing quite melodiously, and from this pleasing lay all gradations may be heard to a trill which is nearly, or quite, as coarse as that of a Chipping Sparrow. Not but that the song of the warbler is readily to be distinguished from that of the sparrow, for it is always given slowly and in a rather low key; whereas the Chippie gives his trill in a shrill, high key and utters it rapidly, besides this his song is longer. The Pine Warblers had ceased singing at Barnstable on August 1. Although they must have been common after this time, we saw them but seldom in our walks through the pine woods. On August 15, however, I came upon a little group of young that were feeding in some pines near the camp in company with some Chickadees. A careful examination of these birds showed that, although they still retained a greater portion of the nestling plumage, they were moulting, for I could see the two lines of new, yellow feathers, one on either side of the breast, appearing among the dull gray of the first plumage. As I was watching them, an adult male evidently the father of the flock, came in sight. He, too, was moulting; tail-less, ragged in plumage on back and breast, he presented a forlorn appearance of which he seemed fully aware, for, catching sight of me, he at once disappeared among the thick foliage of the pines, where, in obedience to a few low call notes which he gave as he went, he was followed by his offspring.

PRAIRIE WARBLER.***Dendroica discolor.***

Plate V, Fig. 3, male; Fig. 4, female.

Size, 4.50 to 5.20 Yellow beneath, with black streakings on sides of head, on neck and on sides; above, yellowish green. Locally common in Eastern Massachusetts and southward.

MALE. Yellowish green above, with a few prominent spots of chestnut in the middle of the back. Space above and below eye and lower parts, excepting abdomen and under tail coverts, which are white, yellow, with a series of spots and streaks, beginning at base of bill and extending along sides, black. Wing bars, yellowish.

FEMALE. While generally similar to the male, is much more dull in color, with the chestnut of back not very clearly defined, and the streakings beneath are dusky, not black.

YOUNG. Similar to the adult female, but paler, and, especially in females, often without a trace of chestnut above or spots below.

DIMENSIONS. Length, 5.75; stretch, 7.03; wing, 2.25; tail, 1.85; bill, .45; tarsus, .70.

COMPARISONS. Readily known in the adult stage by the yellow beneath with black streakings as described, and chestnut spots on back. In other stages by the yellowish wing bars, this being the only species of New England warbler that has these so colored.

NESTS AND EGGS. Nests, compact structures, placed in bushes, composed of weeds, strips of bark and grass, etc., lined with very fine grasses.

Eggs, four or five, white, spotted and blotched irregularly with reddish-brown and lilac. Dimensions, .60 by .50.

GENERAL HABITS. The Prairie Warbler did not receive a very appropriate name as it is not found on grassy plains, but occurs on hill-sides and in fields grown up to bushes. At least this is its regular habitat here in Massachusetts, and on the Bahamas it also occurs in similar growths. In Southern Florida and among the Keys I found these birds in man-

grove swamps; a singular place for a bird which almost everywhere else inhabits uplands. Further north in Florida it occurs on the edges of hammocks, sections of woodlands which are covered with a thick growth of mixed deciduous trees.

The Prairie is a restless warbler, constantly flitting from bush to bush, but, especially during the breeding season, never moving far from a chosen locality.

BREEDING HABITS. The Prairie Warblers place their neatly constructed nest in a low bush, thus not far from the ground. Unlike the Chestnut-sided Warbler, this species is not sensitive in regard to its nest being examined. In fact, unless the eggs are on the point of hatching, or the nest contains young, neither male nor female exhibit any great solicitude when their breeding place is approached.

SONG. We have found that the Pine Warbler utters a sparrow-like song, which is, however, given much more musically than that of the Chippie which it resembles. Again we find a warbler that sings like a sparrow, but this time less musically, for the song of the Prairie Warbler is a trill given in an ascending scale quite like that of the Field Sparrow. While of course the sparrows vary much in regard to the sweetness of their songs, I have never yet heard a Prairie Warbler that could sing as melodiously as even the least skillful Field Sparrow. Many of my pupils think the Field Sparrow's song melancholy, but to me this, the sweetest of all bird songs, does not express sadness but perfect peace; it is breathed forth without an apparent effort, and is in perfect harmony with the quietude of a June day in the fields. One listens in rapture to this lay and longs for its repetition. On the other hand, the song of the Prairie Warbler, although possessing enough of the characteristics of the music of the sparrow to strongly remind one of it, is disappointing on account of a certain harshness that enters into it.

As both the Field Sparrow and Prairie Warbler often inhabit the same localities, the songs of both are frequently heard together, and then the harshness of the warbler's lay is quite noticeable, but when heard alone, it sounds more musical. Thus I was glad enough to listen to the songs of the Prairie Warblers that I heard in the Bahamas in April, and again among the mangrove swamps of Southern Florida in May.

It is worthy of note that the Cayman Warbler, a species which occurs on the Cayman Islands, in the Carribean Sea, and which is closely allied to the Prairie Warbler, has a song that somewhat resembles that of a small species of finch (an *Euetheia*), that also occurs on the same islands. This song is quite unlike that of any other warbler with which I am acquainted, sounding like "*Zip zup zip, see-e-e*", lisping and long drawn out, especially on the last syllable.

MIGRATION AND BREEDING RANGE. I found the Prairie Warblers abundant on Key West in November and December, 1870 and in January, 1884. I have also found them the most common of all the warblers all over the Bahamas in winter, from Inagua northward; in fact, they even occur on little, outlying keys, away from the larger islands. They were common on Jamaica in the winter of 1888.

They begin to move northward the last week in March, and I found a few on Cayman Brac from the 22 to the 24 of that month. Although some begin to leave the Bahamas about April 1, they are common up to the middle of this month, and do not all disappear until the first of May. They migrate through Middle Florida from the last week in March until the middle of April, but here, as elsewhere, they are most common near the salt water, or within a few miles of it. They arrive in Massachusetts the first week in May, and occur most commonly along the coast or, at best, within fifteen

miles of tide water. They are, however, to be found scatteringly throughout other portions of the state, but are everywhere of local distribution, their range being restricted, as already mentioned, to brushy fields and hillsides. They nearly all leave for the south the first week in September.

YELLOW RED-POLLED WARBLER.

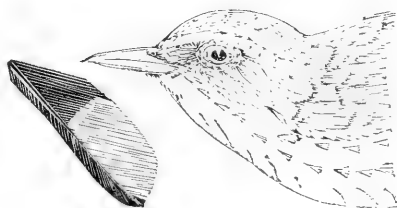
Dendroica palmarum hypochrysea.

Plate V, FIG. 5, male; FIG. 6, female.

Size, 5.20 to 5.65. Brownish-green above; yellow below, with top of head, streaks on sides and across breast, chestnut. Wing bars, indistinct. A common spring and autumn migrant.

MALE. Brownish-olive above; becoming yellowish on rump., Beneath. bright yellow. Top of head, a portion of ear coverts, streaks across breast and on

FIG. 31.



Head and outer tail feather of Yellow Red-pollled Warbler.

sides, chestnut. Line over eye, yellow. Wing bars, indistinct; pale brownish. Basal outline of spot on outer tail feather, crossing the web at right angles, or a little obliquely (see Figs. 31 and 32).

FEMALE. Similar to the male, but with less chestnut on the crown, and with fewer streaks beneath.

ADULTS IN AUTUMN. Not as bright beneath as in spring and the chestnut of the crown is somewhat obscured with olive-brown.

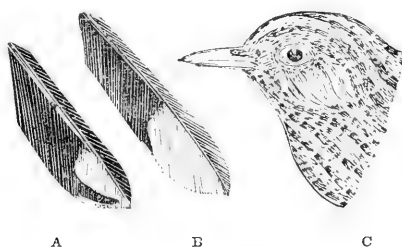
YOUNG, are even paler than the autumnal adults, and show very little trace of the chestnut crown, while the chestnut streakings beneath are replaced by dusky.

NESTLINGS. Golden-brown above; reddish-white beneath, tinged on the breast and sides with yellowish, streaked all over with dusky. White spots on tail similar to those of adult, but not as large (see fig 32)

DIMENSIONS. Length, 5.39; stretch, 8.25; wing, 2.50; tail, 2.50; bill, .45; tarsus, .75.

COMPARISONS. Known from all other warblers, excepting the following species, when in the adult stage, by the full chestnut crown, also see habits. The young somewhat resemble those of the Cape May, but can always be distinguished by the yellow under tail coverts and browner back; both Red-polls being browner above than any other of our warblers.

FIG. 32.



B, first; A, second tail feathers: C, Head of Nestling Yellow Red-poll Warbler.

NETS AND EGGS. Nests usually placed on the ground, and composed of weeds, grasses and moss rather carelessly arranged, lined with fine roots and pine leaves. Eggs, four, oval, creamy-white, with blotches of brown around the larger end. Dimensions, .68 by .65.

GENERAL HABITS. During the first warm spell which we have after the beginning of April in Massachusetts, when the sun shines warm on southern exposures, we may expect the Yellow Red-polls. They are fond of sheltered situations near woodlands, or along fence rows or stone walls, where they may be seen feeding on the ground or near it. They are rather social in disposition, occurring in scattering flocks.

They are not especially shy, but even if they do not allow a near approach, they may be recognized by the habit they have of constantly raising and lowering their tails. Some other warblers have a similar habit, the Yellow-rumps, for example but the tail is moved much oftener by the Red-polls.

In the south, where these warblers spend the winter in large numbers, they prefer the open fields, or even marshes where the grass is short, as feeding grounds. Here they often associate with the Titlarks, which also have the habit of jerking the tail, and both species run nimbly about on the ground together, when the Red-polls look like miniature representatives of their larger friends.

In Autumn, when the Red-polls are not as often seen with us as in spring, they are often found in tree tops with other warblers, and when migrating in the spring they may be occasionally found in the woodlands.

BREEDING HABITS. I have never met with this warbler on its breeding grounds, thus know nothing from personal experience of its habits during the nesting season.

SONG. The ordinary alarm note of the Yellow Redpoll is a sharp chirp, and this is all I have heard them utter in the south, but in spring in Massachusetts, they have a song which is given at rather prolonged, irregular intervals. It is a low, rather feeble warble or trill, consisting of several detached notes, rising from the beginning to the middle, then falling to the termination.

MIGRATION AND BREEDING RANGE. These warblers occasionally breed in eastern Maine, quite commonly in Nova Scotia and New Brunswick and northward. On the southward migration they pass Massachusetts from the middle of September, sometimes a little earlier, until the middle of October. They are found in winter from North Carolina (I found them at New River on November 16, 1901) to Key West,

Florida, but I have never seen a specimen on the Bahamas nor in the West Indies. The northward migration begins in Florida in March, but I found a few about Salt Lake as late as April 10, 1876. I have found them in Massachusetts from April 8 to May 15.

RED-POLLED WARBLER.

Dendroica palmarum.

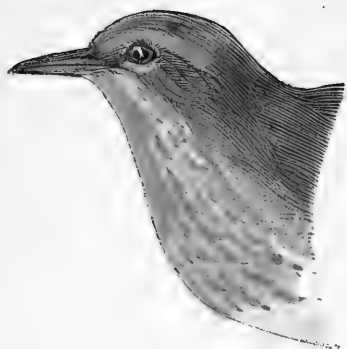
Plate VI, Fig. 1, male; Fig. 2, young female.

Size, 4.50 to 5.20. Above brownish-olivè, with throat, breast and under tail coverts yellow, remaining lower parts, white. Occurs in New England as an uncommon autumnal migrant.

COMPARISONS. The Red-pollèd Warbler differs from the closely allied Yellow Redpoll in being a little smaller, and in the adult stage a portion only of the lower parts are yellow as given above. In the young the under parts are merely tinged with yellow, excepting the under tail coverts which are always pure yellow, and by this character, and the olive-brown back, the species may always be distinguished.

GENERAL HABITS. In the south, where I have seen a great deal of the Red-pollèd Warblers, I have always found them in open sections; in Florida often associating with Yellow Redpolls. They are very unsuspicious, and I found them common in the streets of Nassau in January, 1884, where their shrill chirping attracted my attention almost as soon as I landed. One came regularly that year to the yard of my house, and fed there undisturbed by the cats, dogs, pigs, and bipeds, black and white, which frequented the place. This bird had only one eye, and I was thus enabled to distinguish it from others. It came regularly every morning until March 21, when it disappeared until the 29, after which I did not see it again. The Red-poll does not differ in breeding habits from the Yellow Redpoll.

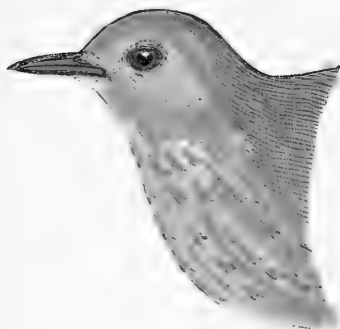
PLATE VI.



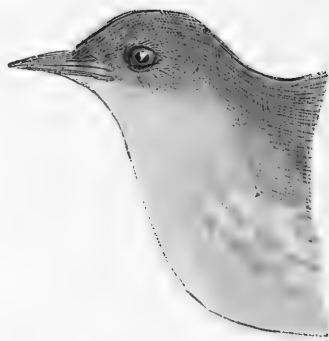
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EXPLANATION OF PLATE VI.

Red-polled Warbler, 1, male, 2, female, young.

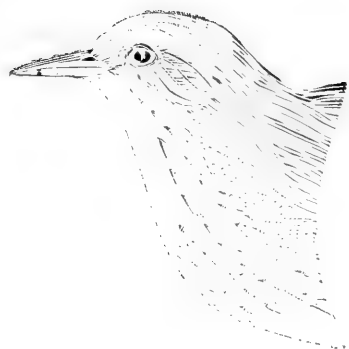
Yellow " 3, " 4, "

Yellow-throated " 5, (both sexes similar).

Worm-eating " 6, " " "



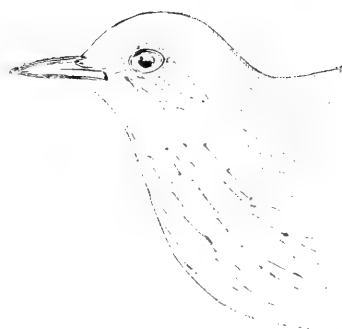
PLATE VI.



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MIGRATION AND BREEDING RANGE. The Red-poll'd Warblers breed in the northern interior of North America as far as Great Slave Lake. On their way south in Autumn they show a tendency to approach the Atlantic coast, and thus a few stragglers may be found as far north as Massachusetts during some seasons, the time of their occurrence being from the middle of September until the middle of October. It is probable, however, that not all of the individuals that visit Florida go by the way of the Atlantic States, for I found a few at Sandford as early as October 1, 1887, and they were not common until the middle of that month, but the first to arrive probably came directly south through the interior of the United States. On November 16, 1900 I found them at New River, North Carolina, and from this point southward into Florida, in which state I have always found them common, in suitable situations, wherever I have been, even as far south as Key West. I have also found them abundant all over the Bahamas, but do not find that I have ever seen a specimen in Jamaica, although it is recorded from that island and others of the Greater Antilles. It is also given as wintering in Mexico and South America.

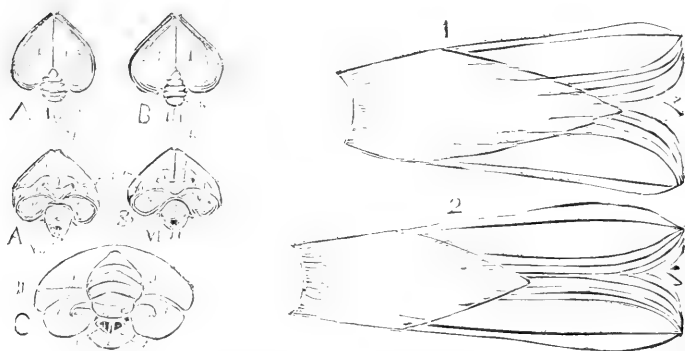
I found it common during the northward migration on Cayman Brac the last week in March, 1888, but some remain on the Bahamas as late as the last of April. On their way north the Red-polls, even those which winter in Florida and the Bahamas, pass directly to their breeding grounds through the interior of the United States, thus none are ever seen in New England in spring.

GENUS. GOLDEN WARBLERS. CHRYSOCANTOR.

Size, medium, 5.00 to 5.50 long. Colors, yellow, streaked with reddish beneath, and usually with more or less reddish on the head. Feathers of wings and tail, brownish, margined on inner webs with yellow. Tail, proportionately short, but its under coverts are more than two-thirds its length. Habits, less arboreal than in the Wood Warblers.

Members of this genus are mainly confined to tropical and sub-tropical regions of America, where there are a number of species; one species, however, has extended its range nearly all over North America.

FIG. 33.



1, Under side of tail of Yellow Warbler. 2, same of Chestnut-sided. A, upper side, A', under, of brain of Yellow Warbler; B, upper side, B', under, of brain of Chestnut-sided; C, hind brain of Yellow Warbler (enlarged). I, cerebrum; II, cerebellum; III, medulla oblongata; IV, optic nerve; V, optic lobe; VI, spinal cord, in all.

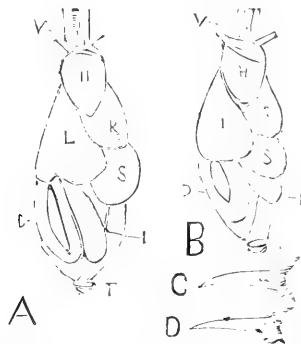
In the following comparative diagnosis I have used a Yellow Warbler as a type of the Golden Warblers, and a Chestnut-sided as a typical form of the Wood Warblers in place of the Yellow-rump, which is usually regarded as the type. This I have done because the Chestnut-sided, while equally typical of the genus *Dendroica*, is about the same size as the Yellow Warbler, hence the two species are more easily compared.

Both individuals of the Yellow and Chestnut-sided Warblers (I am using specimens preserved in formalin) are 5.00 long, with the wing 2.50. Bill and

skull together of both are of the same length (1.14), but the Yellow has the bill narrower with the upper mandible less curved (see Fig. 34, D, Yellow; C, Chestnut-sided) and the skull, measured across the base, .05 less. This difference in the form of the skulls gives a corresponding difference in the form of the brains. Thus while the cerebellum remains about the same size in both species (see Fig. 33, A II, Yellow ; B II, Chestnut-sided), the cerebrum of the Yellow is smaller (see Fig. 33 A I and B I), as are also the optic lobes (see Fig. 33, A' v and B' v, both cuts of lower side of brain), but the medulla oblongata is about the same size in both (see Fig. 33, A' VI and B' VI).

The cervical vertebrae in both warblers are ten, but in the Yellow each is narrow and long, so that the entire neck is .10 longer than in the Chestnut-sided. The length of the back in both is about 1.16, measured to the oil sack, but this is larger in the Yellow (see Fig. 35, A II, Yellow ; B I, Chestnut-sided).

FIG. 34.



V, viscera of Yellow Warbler; B, same of Chestnut-sided; V, syrinx; H, Heart; L, right, R, left lobes of liver; S, Stomach; I, Intestine; D, Duodenum; T, Vent. C, Upper mandible of Yellow Warbler; D, same of Chestnut-sided.

Beneath both have the bodies of exactly the same width, and the keel of the sternum is of the same length (see Fig. 35, A, Yellow ; B, Chestnut-sided ; κ, keel in both), but in the Yellow the abdomen is longer, measured from the posterior end of the keel to the vent (see Fig. 35, A).

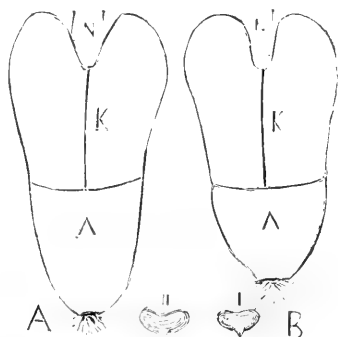
In the wing bones, the humerus and the hand of both are of the same length, but the forearm of the Yellow is shorter by .04. The second primary of both is the longest, and both have nine secondaries.

The tails are of quite different proportions, that of the Yellow being .25 shorter than that of the Chestnut-sided, yet its under coverts are .22 longer (see Fig. 33, 1, Yellow ; 2, Chestnut-sided), but there is less difference in the upper coverts.

The entire leg is longer in the Yellow and the feet are larger. The femur is of the same length in both (.60), but the tibia of the Yellow is .09 longer, and the tarsus .07.

Internally we find some striking differences between the two. The gullet of the Yellow is .05 longer to the proventriculus, but the proventriculus itself is .05 shorter (see Fig. 36, I P, Yellow ; D P, Chestnut-sided), but the stomach of the Yellow is larger ; .50 long, .40 wide and .21 thick (see Fig. 36, I s), while that of the Chestnut-sided is of a different form, being proportionately thick for its size : .40 long, .37 wide and .21 thick (see Fig. 36, D s). The walls in that of the Yellow are somewhat thicker proportionately (see Fig. 36, H w w) than in that of the Chestnut-sided (see Fig. 36, C w w). The fold of the duodenum is about the same length in both in proportion to the size of the

FIG. 35.



A, body of Yellow Warbler ; B, same of Chestnut-sided : M, neck ; K, keel ; A, abdomen ; I and II, crop sacs, detached.

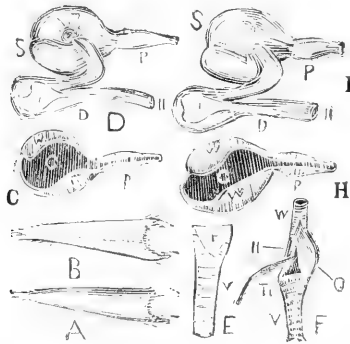
stomach, as is also the pancreas (see Fig. 36, I I), The intestines of the Yellow measure 3.25 to the coecal appendages, and are .60 longer than those of the Chestnut-sided. The liver is larger in the Yellow, but the large stomach causes a greater difference in size between the right lobe and the left (see Fig. 34, A, Yellow ; B, Chestnut-sided L R, being the liver and s, the stomach in both). The tongues of both are bifid, but that of the Yellow is rather more fleshy and not as well provided with fine bristles at the tip (see Fig. 36, A, tongue of Yellow : B, that of Chestnut-sided.

S U M M A R Y .

I will now give a summary of the chief points of difference between these two birds, and, as far as possible, a reason for these differences. I may say in advance that I know, from a careful study of the American Warblers, begun many years ago, and continued at various times as opportunities offered, that each of these birds is a typical representative of the genus to which it belongs.

ORIGIN OF THE GENERA AND DISTRIBUTION. While a few species of of the Wood Warblers (*Dendroica*) are still to be found scattered through the sub-tropical region of America as residents, and it is highly probable that they *all* originated there or further south, the greater number now return to their ancestral homes as winter visitors, migrating further north in summer to breed. Exceptions to the rule that all the individuals of all the species migrate south in winter, may be found in the Yellow-rump, in which species, although a large number migrate as far south as Florida, and some even to the West Indies, many remain further north: some spending the winter in Massachusetts. Another exception, but in another way, may be found in the Pine Warbler. In this species a large number migrate northward in summer, but there are also a large number of individuals that are constantly resident in the Carolinas and southward to

FIG. 36.



A, tongue of Yellow Warbler ; B, same of Chestnut-sided, both enlarged. C, section of stomach of Chestnut-sided ; D, entire stomach of same ; H, section of stomach of Yellow Warbler ; c, lining membrane ; w, walls ; P, proventriculus ; D, duodenum ; I, pancreas ; II, intestine. E, inner side of bronchial tube of Yellow Warbler, enlarged ; F, outer side of syrinx of same ; T, tympaniform membrane ; v, bronchial tube ; w, windpipe ; II, inner bronchialis muscle ; O, outer of same ; Ti, sterno-tracheal muscle.

Florida. While, beyond doubt, the Yellow-rumps are showing an inclination to abandon the habit of migration, this is not so certain in regard to the Pines ; it may be possible that they have, comparatively speaking, recently began to acquire the habit of migration. But without pausing at present to further consider these interesting problems, we may state that, as a genus, the species of Wood Warblers are inclined to be migrants, and in migrating to push northward a considerable distance, often, at least, to the borders of the north temperate zone.

On the other hand, among the Golden Warblers, one species only, the Yellow, is found north of the sub-tropics. Some species have become residents in certain of the West Indies, but many winter in northern South America, which was undoubtedly the original home of all members of this genus.

While not attempting to prove a separate remote ancestral origin for the Golden Warblers apart from the Wood Warblers, I do believe, all things considered, that they have formed a distinct group which has now no immediate connecting link to bind it to any other similar group (see, however, remarks under head of Allied Species).

HABITS. As these are the strongest factors in establishing natural groups among all animals, through evolving changes in organisms, we will next consider them. All of the Wood Warblers are quite arboreal in habit inasmuch as they inhabit woodlands, or at least thickets, the Prairie and its allied form of the Cayman Islands, being partial exceptions to the rule, but the Golden Warblers are as far as I have seen, inhabitants of the open country.

Now let us see what changes have been brought about in these birds through their habits of living in different kinds of country. In the woodlands, which, as seen, are the homes of the Wood Warblers, insects, upon which all warblers mainly feed, are abundant, but they are largely the larvae, many being the soft caterpillars of lepidopterous insects. Warblers are particularly fond of these, but this class of insects in the earlier stage of their existence, are, through protective coloration and habits of concealment, not very easy to find, even by a keen-eyed warbler. On the other hand, insects which are eaten by warblers are not as abundant on low shrubbery in open fields as they are in woodlands, but those which do occur there are more easily seen, yet might be more difficult to capture.

With different game to hunt under different environment, this game varying in habit, the warbler of the woodlands must employ somewhat different methods in capturing its prey from those practised by the warbler of the open country.

The woodland hunting warbler would have to be intelligent enough to understand the color mimicry of one group of caterpillars, and good eyesight enough to detect the hiding places of other groups.

That the Wood Warblers are comparatively intelligent is shown by the large size of the cerebrum, and that they possess superior powers of sight by the large optic lobes, as typified by the Chestnut-sided Warbler.

In contrast, the Yellow Warbler has a smaller cerebrum and optic lobes, for it does not require as much intelligence, nor as good eyesight to capture its prey in the more open country.

One species of warbler would have to be about as agile as the other, hence we do not find any great difference in the size of the cerebellums, or lesser brains. It would be an advantage, however, for a warbler in capturing its prey in an open country to be able to reach a little further for it, thus we find the neck of the Yellow Warbler a little longer than those of the Wood Warblers. As the food of the Yellow Warbler does not consist of as quite such soft material as that of the Chestnut-sided, its digestive system is larger and stronger, necessitating a larger body cavity. With this enlarged alimentary canal and longer body, we

find correlated a short tail, long tail coverts and larger oil sack. The less specialized tongue of the Yellow Warbler would also indicate that it fed on coarser food than the Chestnut-sided. The sternum and accessory bones of both are very nearly alike, as we should expect in two species which are of the same general size and form and which have a common ancestral origin. The larger size of the feet and legs in the Yellow, would be the result of its requiring more grasping power when feeding in exposed situations.

ALLIED SPECIES. The species of Wood Warblers most closely allied to the Golden in structure is the Prairie. This bird has a narrow head, and consequently a brain about the same form as that of the Yellow. It also has a long neck and legs, but here the resemblance ends, for the stomach is large and the intestines short, the tail long and its coverts short. The Cerulean Warbler has a short tail with long coverts, and the stomach is large and the intestines long, but the skull is as wide as that of the Chestnut-sided, while the Blackburnian has a similar structure. Neither of these three species are typical Wood Warblers.

To sum up the whole matter, we find, as shown, that the members of the genus *Dendroica* are very variable in size, form, structure and color, in short, the genus is not homogeneous. In the Golden Warblers we have a natural genus, all members of which are bound together by common characters, forming a perfectly homogeneous group which must be considered as distinct as any other genus among our American Warblers.

YELLOW WARBLER.

Chrysocantor aestiva.

Plate VI, Fig. 3, male; Fig. 4, female.

Size, 4.75 to 5.10. Yellow throughout, darker above, streaked beneath with reddish. A common summer resident, frequenting shrubbery in open sections.

MALE. Yellow throughout, darker on back; streaked on breast and sides with reddish. Wings and tail brown, each feather margined on both edges with yellow.

FEMALE. Similar to the male, but much more dull in color, and with fewer streakings beneath.

YOUNG. Quite dull yellow, with the top of the head uniform with the back; and although the males have a few streaks below the females have none.

NESTLINGS. Very pale yellow, often nearly white below, where there are sometimes indications of streaks. The second plumage, which is assumed some

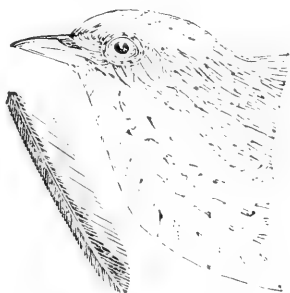
time in August, appears in a line down the throat that divides on the breast and passes along the sides ; this being brighter than the first plumage gives the birds a singular appearance, for they look almost exactly as if they had on yellow neck-ties.

DIMENSIONS: Length, 5.00 ; stretch, 7.55 ; wing, 2.35 ; tail, 1.90 ; bill, .35 ; tarsus, .80.

COMPARISONS. Readily known by the prevailing yellow color and absence of very dark markings; in short, this is the most yellow of all our warblers.

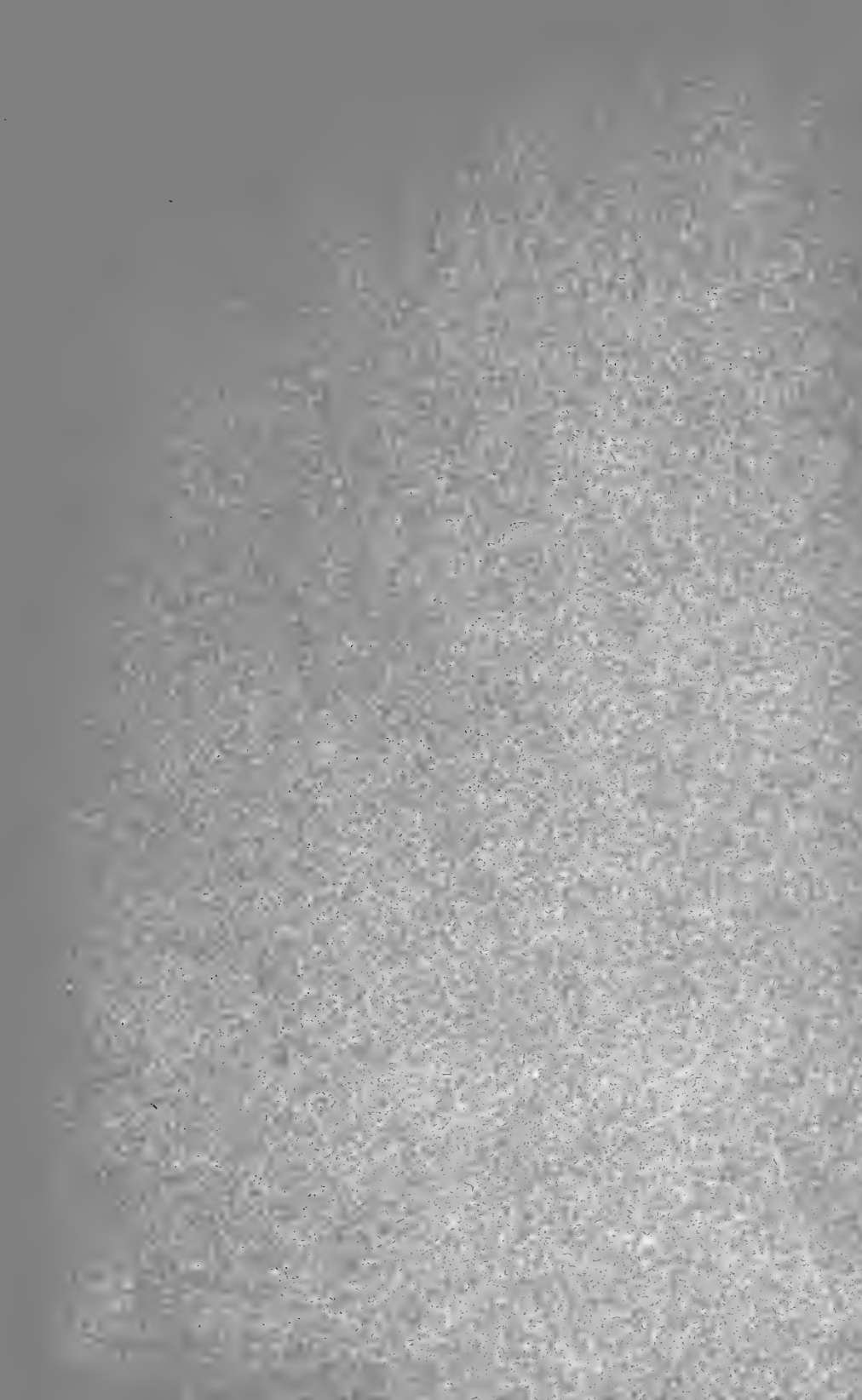
NESTS AND EGGS. Nests, compact structures, placed in trees and bushes, composed of grasses, hempen fibers of plants and cotton, to which is often added the reddish-brown covering of the cinnamon fern ; lined with very fine grasses, horse-hair and cotton. Eggs, four or five, bluish or grayish white, spotted and blotched, often irregularly, with reddish-brown and lilac, generally more thickly on the larger end, where the spots are sometimes fused together to form a ring. Dimensions, .65 by .45.

FIG. 37.



Head and outer tail feather of Yellow Warbler.

GENERAL HABITS. The Yellow Warbler was formerly a very common summer visitor to the whole of the more open sections of New England. Although still common in places where the native shrubbery is allowed to grow undisturbed, I am sorry that I have to state that I notice a sensible diminution in the numbers of this pretty and interesting warbler in the immediate vicinity of the towns and cities of eastern Massachusetts; this decrease being wholly due to the removal of much of the native shrubbery, which once grew so abundant-





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EXPLANATION OF PLATE VII .

Upper figure, Brewster's Warbler, male.

Lower " Lawrence's " "

PLATE VIII.



ly along fence rows and stone walls and in abandoned gravel pits. Twenty years ago Yellow Warblers frequented the shrubbery about my house, and built there or in the neighboring apple trees, but I have not seen a nest about the house for ten years. Much of the shrubbery remains about the place, and I attribute this abandonment to the fact that many changes have been made in the neighborhood, thus removing most of the thickets in which the birds also built, thus my grounds have become isolated from other breeding places. I do not think that there is any less number of Yellow Warblers in Eastern Massachusetts in summer now, taking the natural variation in seasons into account, than there was when they were to be found everywhere, but the removal of so much shrubbery has caused them to go to sections where this has not been disturbed, and, in fact, I can always find them as abundant as they ever were in such places.

Bird lovers are deploring the absence of our native birds from our towns and cities and are saying that they have been driven away by the English Sparrow, when really this species has had comparatively little to do with this depletion. Birds will not live where they do not have the shelter of foliage, and thicket inhabiting species, like the Yellow Warbler, seek native shrubbery, and will not live where they do not find it. It has become a very commendable practice for towns and cities, and also for many owners of large estates, to set apart portions of woodlands as parks; but far less commendable is the habit which most park owners have of clearing up these woodlands, removing what to many seem but unsightly thickets, cutting off the lower limbs of trees, and in other ways polishing up the grounds until but few natural features remain. When I visit one of these sections, that I have often wandered over in the past, for the first time after it has been thus "beautified", and miss the delightfully tangled thickets where Nature ran riot with vine and shrub and fern, and look in vain for the birds, I experience the same sensation that I

should if I visited the home of a familiar friend and unexpectedly found the house empty and no friendly greeting awaiting me. I am sure that other true lovers of nature have felt the same.

What then must the birds feel who have made their homes in these thickets year after year? When I enter a place devastated in this manner I am at once prompted to turn and leave it and seek some other spot that has been fortunate enough to escape the hands of the spoiler. Unquestionably birds have many of the emotions which we possess, the difference being only in degree; therefore what my outraged feelings prompt me to do is, under similar circumstances, done by the birds. They will not conform to the changed environment about their old homes, but will turn and seek new, undisturbed locations. Undoubtedly he who plants a tree, or spares one that is already growing benefits his race, but he who plants native shrubbery, or what is better, spares that which Nature has already planted, benefits the birds, and through them confers a lasting benefit upon mankind.

The Yellow Warblers are rather more deliberate in their movements than most members of the family. One will often sit quietly on a twig for a moment, turning its head about in search of insects, then when one is discovered, it will hop quickly toward it and seize it. These warblers spend a great deal of time in low shrubbery, but are also fond of apple, pear and other fruit trees and may frequently be found in them searching for insects. Although they very often visit the borders of woodlands, they are seldom, if ever, found in the deep woods, in fact, the Yellow Warblers, in common with other members of the genus to which they belong, are preeminently birds of the open country.

BREEDING HABITS. While I have often found the pretty nest of the Yellow Warbler in apple, pear and other fruit trees, and in various kinds of low trees and shrubs, as well, I

have found more in barberry bushes than elsewhere. The birds appear to understand that the armed branches of this shrub form a protection for their nests, hence these bushes are frequently chosen as a summer home. Who can tell, after all, just how much the masses of yellow pendants of blossoms, with a hue so much like the birds own color, and which appear about nesting time, may influence this choice? Another way in which the Yellow Warbler displays considerable intelligence may be seen in its well known habit of often building a second, or even a third nest over the intruding egg of the Cowbird. The nest is built about the first of June; the eggs are deposited at least as early as the tenth of the month, and the young may be seen accompanying their parents by the first of July. While sitting the female seldom leaves the immediate vicinity of the nest, and the male, although somewhat of a wanderer, is seldom far away.

SONG. The song of the Yellow Warbler is a lively lay, and when uttering it the bird pauses in its search for insects and gives all attention to its delivery. The song is a continuous warble, consisting of about seven notes, the last being given in the same key as the first, or a little lower. It is possible to trace a resemblance to this lay in the syllables, "*Sweet sweet sweet to sweetee*". Sometimes the "*sweet*" is given four times, or, again, the song may be shortened by omitting the last syllable. There is a singular resemblance to the song of the Yellow Warbler in that of the Chestnut-sided as this bird sings in spring. Both birds utter about the same number of notes, but the song of the Chestnut-sided is not quite as continuous as that of the Yellow, for there is a pause, although a very short one, just before the last two syllables, and these two terminal notes are given with a rising inflection. Thus the bird appears to say; "*Sweet sweet sweet - - - to weechee*", the pause taking the place of one note given by the Yellow. The Yellow Warbler, however, utters nothing that in any way

resembles the summer song of the Chestnut-sided, which consists of a number of rather energetically given notes terminating with a warble, and is very much like the ordinary song of the Nashville Warbler. But both Yellow and Chestnut-sided give a more feeble song in July; the result of the weakening of the muscles of the syrinx, as explained on pages 43 and 44. As might be anticipated from the great similarity of the songs, the syrinx and its accompanying vocal muscles, are quite similar in both birds. In Fig. 36, F, may be seen a cut of the syrinx and bronchial tube of the Yellow Warbler, somewhat enlarged. w, is the windpipe; o, and II, the syringeal muscles fused into one that is divided to allow the insertion of the sterno-trachealis, TI; v, is the bronchial tube. At E, is given a much more enlarged view of the inside of the left bronchial tube. There are eight complete bronchial rings (see v), leaving space for three half rings, which enclose a very short vibrating tympaniform membrane (see T). Short as this membrane is, it and its fellow on the opposite tube produce most of the sounds which this warbler is capable of uttering, for the other vibrating membrane, the semiluna, is poorly developed. The Yellow Warbler, in addition to the song, gives quite a sharp note of alarm.

MIGRATION AND BREEDING RANGE. The Yellow Warbler breeds commonly from the Carolinas northward, at least as far as Massachusetts, and less commonly, being restricted to the open sections, as far as the Arctic regions. It migrates south early, the majority leaving Massachusetts the first week in September, but a few, probably migrants from further north, may be found later. It winters in Central America and Northern South America. I procured a single specimen on Cayman Brac, April 22, 1888, but this was evidently a straggler as I did not see any more, nor have I ever seen it in any other of the West Indies, in the Bahamas, or in Florida. It arrives in Massachusetts the first week in May.

GENUS. LONG-BILLED WARBLERS. NEODENDROICA.

Size, medium, 5.25 to 5.75 long. Colors, bluish above; yellow and white beneath, conspicuously marked with black. Wing bands and tail spots, present and white. Bill, nearly as long as tarsus. Wings and tail, proportionately short.

We have a single species of this genus added to our list as an accidental visitor from the south. Members of this genus, although closely allied to the Wood Warblers in some ways resemble the Creeping Warblers, especially in habit. The feet, however, are not as large. The birds are slender with a low keel, this not being quite as high as one half the width of the sternum. The tongue is long, slender and horny; its tip is cleft and provided with rather coarse bristles. The stomach is not muscular, thus its walls are rather thin. Type, the Yellow-throated Warbler.

YELLOW-THROATED WARBLER.

Neodendroica dominica.

Plate VI, Fig. 5, male.

Size, 5.25 to 6.75. Bluish above, yellow on throat, white elsewhere beneath, conspicuously marked with black. Casual in New England.

ADULTS. Bluish above, white beneath, with throat and upper breast, yellow. Sides of top of head (sometimes all of it), cheeks spots on sides of neck and sides, black. Spot on side of neck and line over eye, becoming yellow in front of it, white.

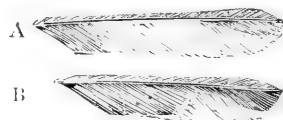
YOUNG. Generally similar, but tinged with greenish above; the throat is not as yellow, and the black markings are not as extended. Both sexes are similar.

DIMENSIONS. Length, 5.35; stretch, 8.35; wing, 2.70; tail, 2.10; bill, .59; tarsus, .62.

COMPARISONS. Readily known by the bluish back, yellow throat and the black markings beneath.

NESTS AND EGGS. Nests, placed in trees, sometimes on the limb of a pine, or occasionally concealed in a streamer of "Spanish moss" (*Tillandsia usneoides*), composed of fine grasses, pine needles, etc. Eggs, four, grayish white, with a ring of lilac, sepia and black spots around the large end. Dimensions, .70 by .52.

FIG. 38.



Spots on the tail feathers of the Yellow-throated Warbler: A, first, B, second.

GENERAL HABITS. The Yellow-throated Warbler is not an uncommon bird in the south in spring and summer, frequenting alike the pine woods and hammocks, associating with the Pine and other warblers. I find that my earlier impression of the species was that it resembled the Black and White Creeper somewhat, moving about on the trunks and along the branches of the trees much like this species. Later notes, however, inform me that I have found it in tree tops, behaving quite like the majority of warblers. As a rule it is not a shy bird and, for a species which usually lives in the wilder sections, sometimes evinces rather unexpected social habits. In December, 1868, I saw one creeping over the roof of a house at Dummett's, East Florida; in March, 1884, I saw one on the stone steps of the government house, in Nassau, Bahamas, and one came every day in February, 1888, for a week or more, to feed on a mango tree that grew in the yard of my house at Kingston, Jamaica.

MIGRATION AND BREEDING RANGE. I have always found this species in Florida in winter, although never in any great numbers, even as far south as Key West, where I obtained a single specimen Jan. 8, 1884. I found them rather uncommon in the Bahamas during the same winter but have never found them there since. As recorded I found one in Jamaica in February, 1888. They become more common in Florida

about the middle of March, and I found them evidently migrating at Enterprise from March 16 to the 24, 1900. In summer the Yellow-throated Warblers are found regularly as far north as Southern Maryland and Virginia, very casually as far north as New York and extreme Southern New England. The only claim that it can have as a member of the bird fauna of Massachusetts rests with a single specimen that was taken in Dedham November 4, 1866, by my old friend Mr. George E. Browne.

SONG. Referring again to my earlier impression of this warbler, I find from notes made over thirty years ago that I thought it sang like a Pine Warbler or possibly like a Black and White Creeper. Songs which I was sure were produced by this species which I heard at Enterprise, Florida, in March, 1900, did not sound at all like the notes of either of these birds. The song was quite simple and consisted of four or five warbling notes. This, however, may have been a practicing song given in early spring, while the breeding song may be different.

GENUS. LITTLE WARBLERS. COMPSOTILYPIS.

Size, small, 4.25 to 4.90 long. Colors, bluish above, with a triangular greenish-yellow spot on the back; yellow beneath, without any decided black markings anywhere. Wing bands and tail spots, usually present, and white.

Most members of this genus are tropical in distribution, occurring in Northern South America, Central America, Mexico and adjacent islands. A single species has reached Eastern United States and this has produced one well defined subspecies.

The bill is shorter than the head, rather slender, and without notch at tip. Tarsus, shorter than middle toe and claw. Coracoid bones, equal in length to the top of the keel.

NORTHERN BLUE YELLOW-BACK.***Compsothlypis americana usneae.***

Plate VII, FIG. 1, male; FIG. 2, female.

Size 4.25 to 4.90. Yellow on throat and upper breast, usually with a patch of sepia on the latter; above bluish, with the middle of back greenish yellow. Common during the migrations throughout the whole of New England, breeding abundantly on Cape Cod and in other sections where the lichen known as the old man's beard occurs on the trees.

ADULT MALE. Slaty blue above, brightest on the head. Yellow on the throat and breast, with a band on the latter streaked with sepia, sometimes mixed with bluish; remaining lower surface, white.

ADULT FEMALE. Similar but duller, and the sepia of the breast is not as prominent.

YOUNG. Somewhat duller than the female, there is less yellow below and often no sepia on breast, and the yellowish patch of the back is sometimes only faintly indicated.

NESTLINGS. Pale slaty-blue above, with no trace of yellow; grayish beneath, slightly tinged with yellow on the throat.

DIMENSIONS. Length, 4.75; stretch, 7.30; wing, 2.30; tail, 1.70; bill, .40; tarsus, .63.

NESTS AND EGGS. Nests, placed in trees, composed of the old man's beard looped into the form of a purse, with the opening on top. Sometimes a little grass is used as a lining, but usually the nest is composed wholly of the lichen. A few nests are hammock-shaped. Eggs, three or four; white, spotted and dotted everywhere, but rather more thickly on the large end, with reddish brown and lilac. Dimensions, .66 by .48.

GENERAL HABITS. Although a large proportion of our warblers have a number of similar habits, careful study will reveal some minor points of difference which will be found valuable in distinguishing species. Thus, while we observe that as a rule, the warblers have a rather swift, erratic flight, especially while crossing comparatively narrow spaces, and that all are active, we see that there are some differences in flight, and that there are varying degrees of activity. Few among our

EXPLANATION OF PLATE VII.

Blue Yellow-backed Warbler,	1, male, 2, female.
Golden-winged	" 3, " 4,
Blue-winged Yellow	" 5, 6, "

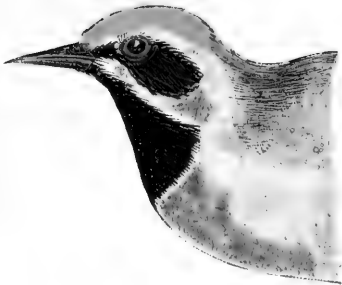
PLATE VII.



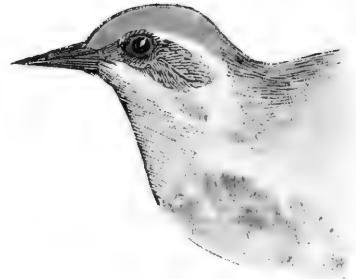
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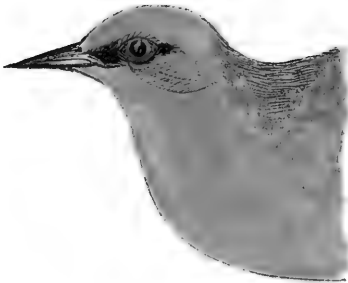
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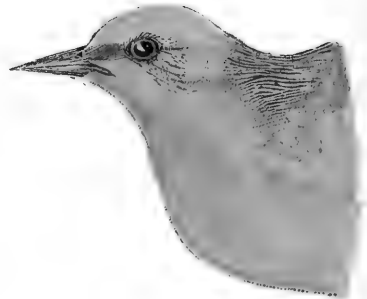
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American Warblers fly more swiftly than the Blue Yellow-backs, and few are more active; it is partly by this very activity, as these plump little warblers hop quickly from twig to twig, that they may be recognized. While, as a rule, these warblers appear to prefer deciduous trees in which to feed, they are often found in pines. This is especially true in regard to the birds of this species which spend the summer on Cape Cod, where they are abundant, and where a considerable portion of the woodlands is made up of pitch pines. Yet, even here, the Blue Yellow-backs show a marked preference for other kinds of woods, and when they do feed among the pines it is only on the outermost trees. They are, however, remarkably fond of the white cedar swamps that are so common on the Cape, and are always found in them.

BREEDING HABITS. Although I found the Blue Yellow-backs breeding at Williamsport, Pennsylvania, May 27, 1876 (this was possibly the southern sub-species), I do not think they begin to breed in Massachusetts until the last of June, and that the eggs are not deposited until the first and second weeks in July; at least, this has been my experience with the species. This statement is based upon observations made through a number of summers at my place in Barnstable. Here the birds more often choose cedar trees in which to build than any other kinds, and I have found quite a number of nests in them. Most of these nests were placed in red cedars, but I have seen some in white cedars.

As is well known, both of these trees, in common with many other species which grow on the Cape, are often so covered with the lichen, called the old man's beard, that they appear gray when seen a little distance away. As those portions of the trees on which the lichen grows the thickest are the ones usually selected by the birds in which to build, the nests, being composed, at least outwardly, wholly of the gray lichen, are very difficult to see. The best way to find them is to

watch the birds as they come and go to and from the nests. In height from the ground the nests vary from five to twenty feet. I will give examples of a few nests found this summer (1902). On June 30, when in company with some pupils, a nest was discovered in a red cedar, not over five feet from the ground, and another in the same tree, about ten feet up. On July 1 I found another in a white cedar, some six feet high; but neither of these nests contained eggs, having been freshly built. On July 5 a nest was observed by some of my pupils in a white cedar, the birds having been seen going to it. This was about fifteen feet up, and on the tenth of the month was found to contain three eggs. On the twentieth I found either this nest or another in the same tree, at about the same height, but empty. As an exception to the rule that the nests of the Blue Yellow-backs are always placed in cedars, I can cite an instance where a pair built in a lichen-covered apple tree that stands on my place not far from the house. The nest was placed about six feet from the ground. This was in the summer of 1898, and the birds succeeded in rearing a brood there. All of the nests of this species that I have seen have been placed at the extremity of branches.

The young leave the nest about the first of August, and in company with their parents wander about the country, but as the males have ceased singing, it is not easy to find birds of this species of any age at this time. Last summer I looked in vain for them for some days before I found any, then I came quite unexpectedly upon a little family, consisting of a female and two young. My attention was attracted to them by hearing the low, twittering cry of the mother. All were together in an apple tree when I first saw them, and permitted me to approach very near them, but finally flew away into some neighboring pines. The young, although fully grown, were still in the nestling plumage, and were being fed by the old bird, but I did not hear them utter any cry.

SONG. The earliest date that I have heard the Blue Yellow-backs sing is March 29. This was at Nassau in 1884. They sing while migrating through Florida and northward; thus they were in full song at Barnstable when I arrived there the last week in June of this year, and they continued to sing generally as late as July 15, after which date most of them became silent, but I heard a single one give the full song on the eighteenth of the month.

The song is somewhat variable, but is always unmistakable, as it is peculiar in intonation as well as in method of delivery. The full song begins with three or four lisping or wheezy notes, and ends with a sharp, almost lash-like note. The entire song may be rendered by the syllables, "*Sweet sweet sweet sweet swee-zer*". This entire song is not always given, for often the two last notes are omitted, I noticed no difference in the song from the first of the season to the last, and was quite surprised to find that the birds had ceased singing without any preliminary shortening or other change in their lay.

MIGRATION AND BREEDING RANGE. As separated from the southern form by Mr. Brewster in 1896, the Northern Blue Yellow-back is restricted to New England, New York, and the northern tier of states, and northward into Ontario, Nova Scotia, and New Brunswick. Through this range, however, it actually breeds only where the usnea lichen occurs in sufficient abundance to form long tufts on the trees. It thus occurs commonly on Cape Cod, in Maine and in places in other northern sections mentioned, and locally elsewhere, for wherever the lichen appears, even if it be confined to a single tree, these warblers will usually find it and nest in it. A single red cedar which stands near Hurd's Pond in Wayland, Massachusetts, was, some years ago, plentifully overgrown with the usnea lichen, and as long as this remained on the tree in any quantity the Blue Yellow-backs nested in it. Unfortunately my notes made before the separation of the sub-species do not

state which form I saw, thus I am unable to give the exact winter range of our Blue Yellow-back. One or both forms occur at Key West, on the Bahamas and in the West Indies. They begin their northward migration in early April, arriving in Massachusetts the first week in May. Almost all depart for the south about the first of September, but I found a few lingering about Watsontown, Pennsylvania as late as the twenty-ninth of that month.

FIG. 39.



Sternum of Blue Yellow-back.

GENUS. SHARP-BILLED WARBLERS. HELMINTHOPHILA.

Size, rather small, 4.25 to 5.25 long. **Colors**, bluish or greenish above; yellow, greenish-yellow and white beneath. **Wing bands and tail spots**, present or absent. **Bill** about equal in length to the head and very sharp. **Tarsus**, longer than middle toe and claw.

Members of this genus may be divided into two groups: A, wing bands and tail spots present, and with black markings on the sides of head (dusky in females), and sometimes with black breast or throat patch (absent or dusky in females); B, wing bands and tail spots, absent (sometimes the feathers of the latter are margined with white), and there are no prominent black markings anywhere. The height of the keel is equal to one-half the width of the sternum. Coracoid bones shorter in length than the top of the keel. The tongue and some other structural characters appear to vary somewhat specifically. The nests of all our New England species are placed on the ground. The species are mainly confined during the breeding season to temperate North America; thus none are tropical.

A: wing bands and tail spots present.

GOLDEN-WINGED WARBLER.

Helminthophila chrysoptera.

Plate VII, Fig. 3, male; Fig. 4, female.

Size, 5.00 to 5.30. Bluish above; white beneath; throat and patch on side of head black. Wing bands, yellow; tail spots, white. Locally common in summer in New England from Massachusetts southward.

ADULT MALE. Above bluish ash, with the top of head and broad band on wing, lemon yellow. Lower surface and line over eye ashy white, slightly tinged with bluish ash on sides and flanks. Patch on sides of head and throat, black.

ADULT FEMALE. Generally similar, but the black markings are replaced by dusky, the upper parts are tinged with greenish, and the lower with yellowish.

YOUNG. Quite similar to the female, but males have the dark markings blackish.

NESTLINGS. Pale golden ashy throughout, lighter on abdomen. Tips of two rows of wing coverts, golden, forming two wing bars. One specimen, apparently a female, has the wing bars narrower. Tail, undeveloped. Swollen portion of gape, yellow. This description was taken from living specimens, see further account under Breeding Habits.

DIMENSIONS. Length, 5.10; stretch, 7.90; wing, 2.50; tail, 1.85; bill, .50; tarsus, .70.

COMPARISONS. Readily distinguished in all stages by the decidedly golden wing bars and black or dusky throat,

NESTS AND EGGS. Nests, placed on the ground, composed of dried leaves, grape vine bark etc., lined with fine grass and sometimes horse hair. Eggs, four; oval, white, spotted and blotched everywhere, but rather more thickly on the large end, with reddish-brown and lilac. Dimensions, .55 by .66.

GENERAL HABITS. The Golden-winged Warblers are rather common in eastern Massachusetts during the spring migration, and locally common all summer. They frequent low growths of scrub oaks, birches, poplars, etc. They are, however, not found in all such growths, but are of local distribution. In this vicinity they are found on the hilly portions of West Newton and Newtonville, and southward to

Needham and Dedham. They are common on the east side of Prospect Hill in Waltham, but are less often seen north or east of this point. When they have once fixed upon a location they are apt to return to it constantly year after year. The first Golden-winged Warbler I ever saw was in West Newton, thirty-five years ago. The bird was singing in a low growth of mixed trees and shrubs near the road side. Two years later I found a nest in this thicket, and have frequently heard the birds singing there since; in fact, the past summer (1902) I saw a fine male within a few yards of where this nest was placed. He was undoubtedly a direct descendant of the very same birds that I found there so many years before. On the west side of Mill street, about an eighth of a mile from Walnut street Newtonville, two wood roads turn into a low growth of trees. These roads begin some forty yards apart, but after a course of fifty yards, come together and form one, thus making a triangular patch of thicket, bounded by their diverging forks and Mill street. As long as I have known this place, now a number of years, I have known it as the summer home of a pair of Golden-wings. Way back in the seventies a nest was found in this immediate neighborhood, and two years ago I saw another about in the middle of the patch. I could cite other instances where these birds have remained constant to particular locations since I have known them, and for how long a time before will, of course, be a matter of mere conjecture, but in all probability they occupied these thickets as soon as the heavy growth of timber was removed, and it is equally probable that they will continue to occupy them as long as a sufficient growth of shrubbery remains to afford them protection. Few, if any, among our warblers exhibit such a strong love for a chosen spot. The Prairie Warblers leave a location in which they have become established with great reluctance; but too many changes in the immediate vicinity of their breeding grounds, even if they do not involve the nesting

sites of the birds, such as the removal of woodlands, building houses, etc., will cause them to abandon localities where they have lived for years. Not so the Golden-wings; near most of the breeding places of which I have spoken, and others with which I am familiar, many changes have taken place, woodlands have been removed, streets have been cut, and houses have been erected, in some cases so near that those who live in them must be able to hear the songs of the Golden-wings as they give them over their ancestral nesting sites.

When feeding these are very active warblers, but at times during the day, especially toward noon, they become more quiet and then the males may be often found perched on some tree in the vicinity of the breeding ground singing their quaint low songs. In the Golden-wing activity does not mean restlessness, for they are seldom wide wanderers, but are usually found about their breeding grounds.

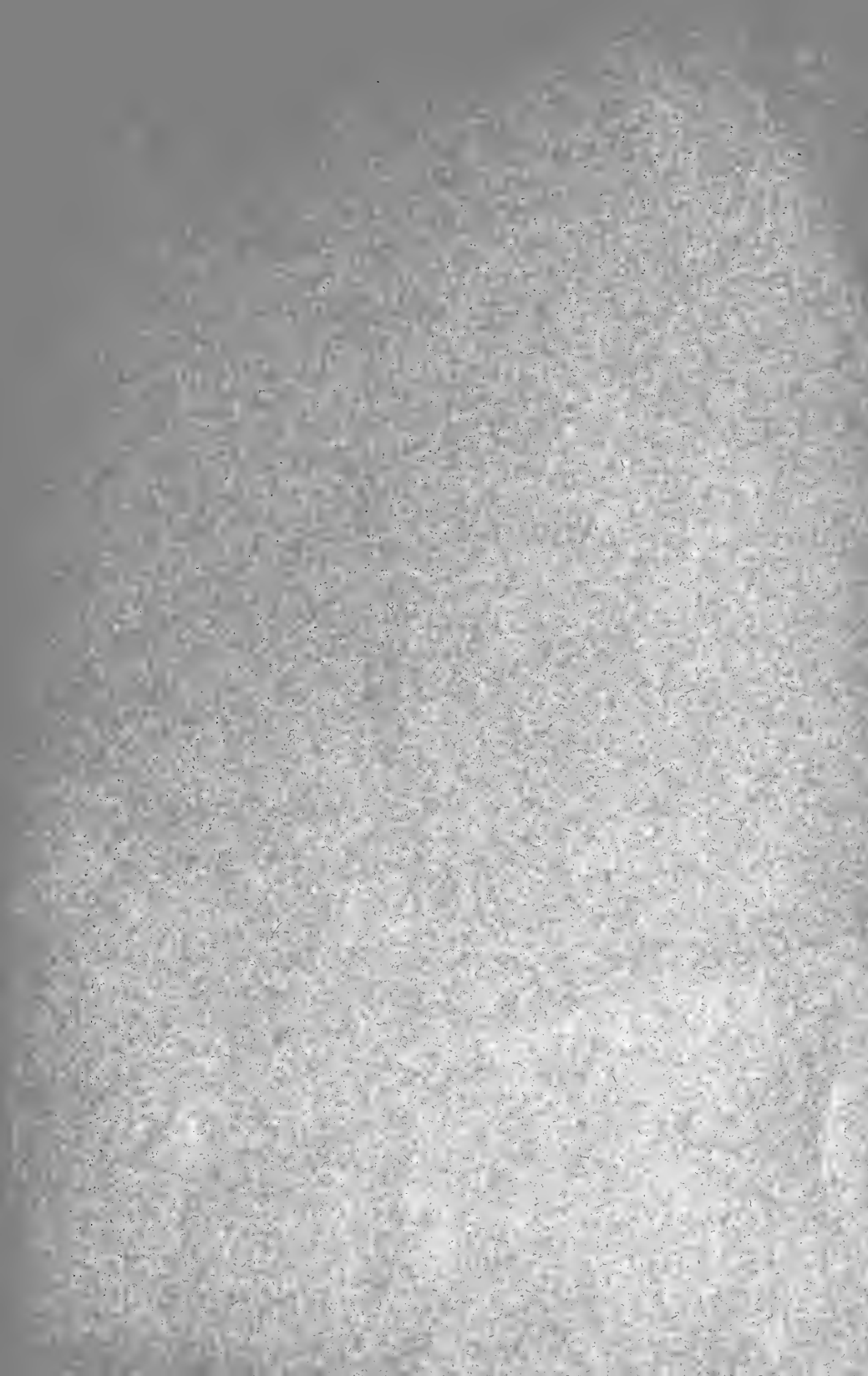
BREEDING HABITS. The first nest of the Golden-winged Warbler that I ever saw was the one, already mentioned, that I found on West Newton hill. As this was the first nest of the kind that had ever been recorded from New England, and as I was at the beginning of my ornithological career, I was naturally much pleased. Before me is my note book, containing the original entry, from which I give extracts.

"June 12. 1869. Walking this morning in a lane which goes by Eldredge's, West Newton, I observed a female Golden-winged Warbler in an elm tree. As she chirped upon seeing me, I surmised that she might have a nest near, and retreated to the road, a short distance away, to watch her, when in a moment she flew down to the ground among some ferns. I then approached, got over the fence, walked a few steps, when the bird started from her nest at my feet. * * * * * The spot chosen by the bird was within a few feet of the lane and within eight rods of the highway. It was placed upon some moss, but not in a depression. There were ferns growing near, one of which extended over the nest; there was also some short grass and a few weeds about it, but there was little attempt at concealment, and I had no difficulty in discovering it. The land upon which it was built was quite high but close to a swampy thicket, * * * * * The nest contained four eggs of the warbler and one of the Cowbird.

Although in after years I have on several occasions seen Golden-winged Warblers behaving in such a way that I was confident that there was a nest near, I did not succeed in finding another until June 7, 1899. On this date I was standing with some pupils beside the triangular patch of low trees, of which I have spoken, on Mill street, Newtonville, listening to the song of a male Golden-wing, when I saw a female fly to the ground in the midst of the patch. Going to the spot, I found a partly completed nest on the ground among the fallen leaves of the previous year; it was not concealed in any way. The land was high. I can say nothing more of this nest, as I was unable to visit it again.

On June 20, 1900, when with a class of pupils in Needham we saw a male Golden-wing with a caterpillar in its bill. After watching it a moment we concluded that it had young in the vicinity. One of the ladies, after searching a moment, saw the nest among the bushes. It was placed on high ground and was surrounded with leaves, but without any attempt at concealment. It contained three young Golden-wings and a young Cowbird. As I stooped over to look at the little birds they all flew out of the nest, which we then saw contained an unhatched egg. We very easily caught the young, and found them all, including the Cowbird, quite tame. The little warblers sat contentedly on one of the ladies fingers while I wrote a description of them. When the young birds flew, and they were capable of flying about a yard, they uttered a chattering cry; the parents would then come within a few feet of us. It was amusing to note that both male and female Golden-wing were as anxious for the safety of the little Cowbird as they were for that of their own offspring. The young warblers perched quite readily on bushes but the Cowbird seemed to prefer keeping on the ground.

The following year (1901) when on Prospect Hill, Waltham, with a class, our attention was attracted by hearing the





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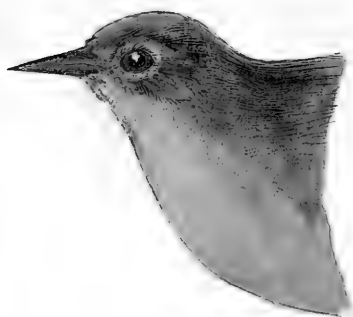
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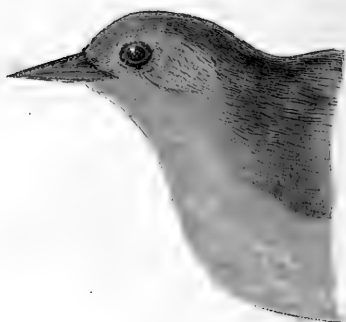
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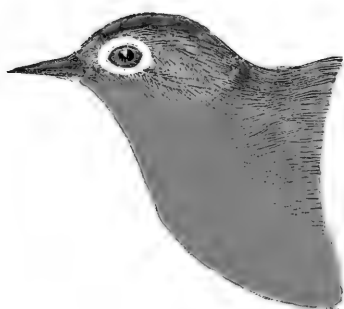
PLATE IX.



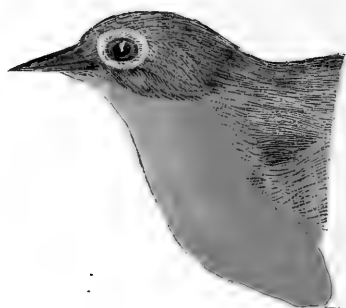
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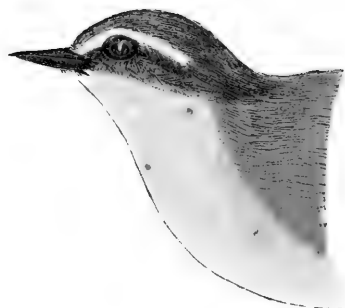
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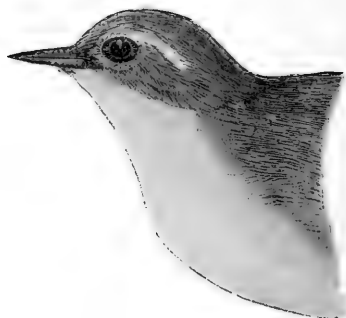
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EXPLANATION OF PLATE IX.

Orange-crowned Warbler, 1, male; 2, female.

Nashville “ 3, “ 4, “

Tennessee “ 5, “ 6, “

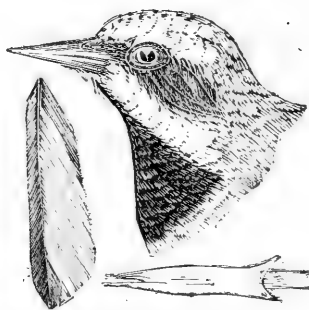
chirping of a pair of Golden-wings, and soon saw that they were feeding some young. The little birds were perched on some bushes and allowed us to approach quite near them without showing any alarm. After a moment the parents, evidently having become accustomed to human beings, as the young were quite near a path in the park, and must have been reared in the immediate neighborhood, began to feed them again without paying any attention to us, thus we had an excellent opportunity to observe the entire family. This nest must have been built on the hill half way to the summit, in a perfectly dry place, but with a pool of water two or three hundred yards away.

SONG. There are few warbler songs which are more monotonous than that of the ordinary lay of the Golden-wing. It consists of a series of lisping or zeeing notes, lazily given all in about the same tone, or descending a little from the first to the last. The following will give some idea of this song in syllables; "*Zee zee zee zee zee*". It has very little volume, and can thus be heard only a short distance. I had been listening to this song for many years and did not suppose the bird ever gave any other, hence was quite surprised when, on June 14, 1898, I heard a rather harsh warbling song which was new to me, and succeeded in tracing it to a male Golden-wing. The bird gave this song repeatedly, and no other at that time. I have never heard this peculiar song since. The alarm note is a rather sharp chirp.

MIGRATION AND BREEDING RANGE. Rather singularly I have never seen a living Golden-wing out of Massachusetts, this is probably due to the fact that they pursue a very regular course in migrating, and that I have never been in this track at the right season. They breed throughout eastern United States from the mountains of the Carolinas, northern New Jersey, northern Indiana, and central Illinois, northward to Massachusetts, south-western Ontario, northern Michigan.

and southern Minnesota. They winter in Central America and northern South America.

Fig. 40.



Head, tongue and second tail feather of the Golden-winged Warbler

BREWSTER'S WARBLER.

Helminthophila leucobronchialis.

Plate VIII, Upper Fig., male,

Size, 5.00 to 5.30. Bluish above; white beneath, with no black on throat, and a small patch only on the side of head. Wing bands, yellow; tail spots, white. Locally common in Connecticut and rare in eastern Massachusetts.

COMPARISONS. Typical specimens are similar in size, form and color to the Golden-winged Warbler, but differ in having no black patch on the throat, in having the black on the side of the head reduced to a narrow line through eye, and in having the wing bands separated, not fused together as they usually are in the Golden-wing. The breast is also tinged with yellow.

Variations from the type, are specimens in which the breast is more yellow, sometimes nearly bright yellow all over. The patch on the side of head may be broad, and the back overwashed with greenish. For remarks concerning the status of this species, see comparisons under Lawrence's Warbler.

NESTS AND EGGS. Similar to those of the Golden-winged Warbler, and the nests are placed in similar situations.

GENERAL HABITS. My personal experience with this species is very limited. On May 18, 1870, I was walking with Mr. Wm. Brewster on West Newton Hill, having gone there

with him in order to show him a Golden-winged Warbler. Here we heard the song of a bird which I then thought was that of a Golden-wing. I called Mr. Brewster's attention to it. He went in pursuit of the bird, and soon came back with it. This proved to be what afterwards became the type of Brewster's Warbler. Rather singularly it has been the last of the species taken in Massachusetts, although a specimen has been unearthed that was captured at Hudson a number of years before the type was obtained.

SONG. As I remembered the song of the warbler taken by Mr. Brewster, I thought it differed a little from that of the Golden-wing. Others who have heard Brewster's Warbler say that the song is somewhat variable, sometimes resembling that of the Golden-wing, sometimes that of the Blue-wing, and at other times being unlike either.

BREEDING RANGE. Brewster's Warbler has been found breeding in Connecticut, south-eastern New York, Long Island, eastern Pennsylvania, New Jersey, Maryland and Virginia. It has also been taken in Michigan and Louisiana.

LAWRENCE'S WARBLER.

Helminthophila lawrencii.

Plate VIII, lower Fig., male.

Size, 5.00 to 5.30. Greenish above; yellow below; line through eye and throat, black. Wing bands and tail spots, white. Uncommon in southern Connecticut.

COMPARISONS. Similar in form and somewhat in pattern of coloration, to the Golden-wing, but differs in being greenish above, yellow beneath, and in having the wing bands white, and the black patch on the side of head is confined to a small spot before and behind the eye.

YOUNG. Similar, but the black patch on the throat is broken by narrow yellow edgings to the feathers.

The exact status of this species and Brewster's Warbler presents a problem which is exceedingly perplexing, and one about which ornithologists have differed

considerably. Below are given three of the theories advanced in explanation of this problem.

Mr William Brewster, writing in 1881, (see Bulletin of the Nuttall Ornithological Club, Vol. VI, p. 218) and in 1886, (see Auk, Vol. II, p. 411) thinks that both forms are hybrids, the result of a union between the Blue-winged and Golden-winged Warblers. His reasons for so thinking being that both of the forms in dispute occur along the line where the two species from which he claims they originate overlap, and, furthermore, that both Lawrence's and Brewster's Warblers show every stage of plumage between what he considers the two parent forms. This being especially true in regard to Brewster's, which, as I have related, also sometimes sings like both of its supposed parents. Under date of December 10, 1902 Mr. Brewster writes me as follows :- " Of the complete intergradation of *leucobronchialis* and *lawrencii* with each other and with *pinus* and *chrysoptera* I have seen the most convincing evidence, although this is not furnished by my series alone ".

Mr. Robert Ridgeway formerly considered Brewster's Warbler as a color phase of the Golden-wing, and Lawrence's as a color phase of the Blue-wing (see Auk, II, 1885, p. 359) ; that is, he thinks that both of what we may, for convenience, call the parent forms, are double colored, just as we find the Screech Owl, the Rough-legged Hawk and some other birds double colored. The cause of this double coloration being unknown, but it appears to be due to extreme individual variation. Later, in his Birds of North and Middle America (1902, p. 454) Mr. Ridgeway says; " that dichromatism as well as hybridism enters into the question of their origin; in other words, while *H. pinus* apparently exhibits, rarely, a white and gray (instead of yellow and olive-green) phase, and *H. chrysoptera*, as rarely, a yellow and olive-green, instead of a white and gray, phase, the two species interbreed to such an extent, not only with one another, but with *H. leucobronchialis* and *H. lawrencii* (the hybrids being fertile *inter se*) that the problem is a very complicated one and therefore most difficult to work out satisfactorily ".

In the revised edition of my Birds of Eastern North America, 1896, pages 577-78. I advanced the theory that both Brewster's and Lawrence's Warblers were not hybrids between *H. pinus* and *H. chrysoptera*, or color phases of either of them, but were incipient species derived, within a comparatively short time, directly from the Golden-winged Warbler. Below I give my reasons for this conclusion.

In 1889 I had an opportunity, through the kindness of Mr. Brewster, of examining his large series of skins of Warblers of the genus *Helminthophila*. Previous to making this examination I had discovered one difference between the Blue-winged Warbler and the Golden-winged that appears to have escaped the attention of all who have described the birds, which is, that in the Golden-wing the terminal white spot on the inner web of the second (not the first) tail feather does not extend along the vein quite to its termination (see Fig. 40, a), whereas in the Blue-wing, this spot does extend along the vein quite to its termination (see Fig. 41). Upon examining Mr. Brewster's series (between fifty and sixty of each species) I found that in a large percentage of each species this character holds good. In about five percent of the Golden-wings I find that the white does extend along the shaft to its termination, and in one or two cases it even encroaches upon the outer web, thus crossing the vein. In a smaller percentage of Blue-wings I find that the white does not ex-

tend along the web to its termination, but this may have been a mark of comparative immaturity. I also find that in quite a number of specimens of this species the white crosses the vein and occupies an elongated space on the inner web, and this may be a mark of high maturity. Both sexes in both species share alike in these markings.

When I learned the facts related it at once occurred to me that this test regarding the spots on the tail feathers applied to both Brewster's and Lawrence's Warblers might, in a measure, settle the vexed question of their specific status. As far as Brewster's Warbler was concerned, all examined were like the typical Golden-wing and had a small, dark space on the inner web of the second tail feather. But when I came to apply the test to the only two apparently adult specimens of Lawrence's Warbler in the collection, one was like the Golden-wing and one like the Blue-wing. A half dozen younger birds agreed with the Golden-wing in having the dark space at the terminaton of the vein. Thus far, then, the evidence shows that the tail coloration of the greater number of both Brewster's and Lawrence's Warblers is similar to that of the Golden-wings, for an examination of a more extended series would doubtless show that the single exception to the rule, noted above, will prove only one of a very small per cent that exhibit the extreme in individual variation.

Now looking at the question regarding the status of both Brewster's and Lawrence's Warblers broadly, guided by the facts as they are presented to us, I do not see how we can avoid the conclusion that I have given, and not consider both of these birds incipient species which have been evolved from the Golden-winged Warbler as related above. We will return to a further consideration of this theory after discussing the two points mentioned.

First let us examine Mr. Brewster's theory. We will begin by counting the points in favor of this theory of hybridization, and it must be admitted that, at first sight, there appear to be some good ones.

First and most important, is color. Both Brewster's and Lawrence's, but more especially the former named, show, according to my observations, supplemented by Mr. Brewster's, as quoted, gradations between the Blue-winged and Golden-winged, and consequently Brewster's and Lawrence's appear to intergrade with one another as well.

Second, there is published evidence which tends to show (unless mistakes have been made) that at least three of the forms, namely the Golden-winged, Blue-winged and Brewster's mate together.

Third, the supposed hybrids occur mostly in sections where the Blue-wings and Golden-wings overlap during the breeding season.

Fourth, Brewster's Warbler is said to sing sometimes like the Golden-wing, sometimes like the Blue-wing and sometimes a song of its own, thus differing from both of the others.

Taking the first point into consideration, we find that, although at first sight there may be apparently complete intergradation, yet there are some things that are difficult to explain by the theory of hybridization. Why do we not find many examples of undoubted Brewster's Warblers with an indication of the dark throat patch of the Golden-wing. I do not know what number have been seen by Mr Brewster, but his own series does not show any, and Mr. Ridgway, in his late work (*Birds of North and Middle America*, Part II, p. 455), speaking of Brewster's Warbler, dis-

tinctly says, "... there is seldom, if ever, an indication of the black throat of *H. chrysoptera*." (It may be remarked, however, that it is not at all certain, judging from what is known of the subject, that the hybrid offspring of closely allied species among birds would show perfect intergradation. There is much evidence to show that they might be quite similar to either parent). Why also do we not find some specimens of Lawrence's partly gray or white? Both of these characters should appear in perfect intergrades. Then again, why do a large proportion of both Brewster's and Lawrence's show the peculiarly formed white spot on the inner web of the second tail feather that is characteristic of the Golden-wing? This character should also intergrade. I am now writing, I must again remark, without an exact knowledge of just what intergradation Mr. Brewster has seen when he speaks of "complete intergradation".

In regard to the second point, I may say that I have carefully gone over the evidence given, and can in every case see a chance for mistakes. In short, I think we need clearer evidence, checked by trained observers, before we can positively affirm that the Golden-winged and Blue-winged Warblers mate together or with either Brewster's or Lawrence's.

Now in regard to the third point, although Brewster's and Lawrence's Warblers do occur in a portion of the region where the breeding range of the Golden-wing and Blue-wing overlap, they do not occur all over it, but are confined to a limited section of it, excepting as mere stragglers. Thus Brewster's Warbler occurs only in southern Connecticut, the lower Hudson River Valley, northern New Jersey, south-eastern Pennsylvania, and north-eastern Virginia; thus leaving southern-central and western Pennsylvania, central Ohio, northern Indiana, central Illinois, and south-eastern Iowa of the section overlapped without the so-called hybrids. Lawrence's occupies even a much smaller area. If the Golden-wings and Blue-wings produce hybrids in one portion of the region where the two species overlap, why do they not produce hybrids in all?

In discussing the fourth point it may be said that Brewster's Warbler sings in varying ways is no more proof that it is a hybrid than that it is an incipient species the offspring of the Golden-wing, for the song would be no more fixed than the color, and reversion toward the ancestral types mentioned below would naturally cause variation in the song.

The most fatal objection to the hybrid theory is the well known law, proved by experiment in several ways, that different species of bird even of the same genus when mated together are seldom fertile, and when fertile their offspring are almost never capable of reproducing, especially when breeding *inter se*. A little reflection will show us that were it not for such a law closely allied species could not exist in close proximity, for were hybridization with fertility possible they would soon intergrade completely. While it is true that closely allied species do not often overlap, or otherwise mingle on their breeding grounds, they sometimes do, witness for example, the genus *Geothlypis* on the island of New Providence, Bahamas, where at least three perfectly distinct yet closely allied species intermingle completely, but as far as known without hybridizing. Our own Chipping and Field Sparrows also offer a familiar example of this overlapping of closely allied species, and we do not find these species hybridizing.

Taking up Mr. Ridgeway's theory of dichromatism, we have only to ask why does not dichromatism occur everywhere among both the Golden-wings and Blue

wings throughout their entire range? I do not now recall any examples of local dichromatism among birds which are so affected.

The theory of evolution now remains, and it must be confessed in the beginning that there are at first sight apparently some serious difficulties in regard to the adoption of this theory. In the beginning, why is it that two such diversely colored forms as Brewster's and Lawrence's Warblers are derived from the Golden-wing? The reasons for the seeming inconsistencies of evolution are difficult to explain. While no one who has given the subject the proper amount of attention will for an instant doubt that all of the Yellow-throated warblers of the genus *Geothlypis* were derived from a common ancestor in the not very distant past, or that the Golden Warblers also had a similar origin, for all of the members of both of these genera are quite alike in general coloration and form, differing only in minor points, a careful study of all our American warblers will also show us that some species even though they are quite differently colored were very evidently derived from a common ancestor. In the genus *Dendroica* we have a number of instances of this, and singularly most of the species that show more or less close relationship appear to be two in number. The Black-poll-ed and Bay-breasted Warblers go together, the Black-throated Green and Townsend's, and the Yellow-rumped and Audubon's, the latter named having given rise to two known sub-species. Coming nearer to the subject in hand we have the Golden-winged and Blue-winged, the latter showing its relationship to the former in the varying color and width of the wing bands. Aided by these suggestions it becomes natural for us to look for the evolution of other species in pairs as we find Lawrence's and Brewster's. One of the first things we learn in the study of the evolution of species is that newly separated forms are apt to be variable, and, singularly, they not only show variations that indicate their direct parentage but those characters which were possessed by ancestors more remote. Hence it is that Brewster's Warbler shows a tendency to assume the yellow under coloration of an ancestor which was yellow beneath, an ancestor from which both the Golden-wing and Blue-wing may have been derived. That both the Golden-winged and Blue-winged had an ancestor either near or remote with yellow under parts and black markings on both throat and breast is highly probable. Hence it is that Lawrence's Warbler, even though it be derived from the white breasted Golden-wing, has through reversion yellow under parts, and a more yellow suffusion throughout, as indicated by the greenish back.

The limited range of the two incipient species can be readily explained under the theory of evolution by supposing that only a few of the new form appeared, possibly only a single brood, but with each individual possessing sufficient potency to transmit the changed characters to its offspring, thus the species gradually spread from one center, and later even became stragglers to more remote regions. It must be borne in mind that it is somewhat difficult for us to estimate the numbers of a given bird; we say a species is very rare because ornithologists have seen a few specimens, but trained observers cannot be everywhere and thus many individual birds escape notice. Hence both of these warblers may be more common than we suppose, and both may have been in existence long before the first specimens were obtained. I believe, however, for a number of reasons, that species often come into existence very quickly, comparatively speaking.

Just why these forms were evolved in a section where two closely allied species overlapped, or, for that matter, why they were evolved at all, must probably forever

remain a mystery. To my mind, however, taking into consideration the extremes of individual variation, the wonder is, not that few species are evolved but that more do not appear. It is to the overbalancing of these extremes of individual variation that we must look for the sudden appearance of new forms, as in Brewster's and Lawrence's Warblers. Species appearing through more gradual changes brought about by environment, as, for example, in the Grackles of Eastern North America, and in many other species and sub-species, assume recognizable characters only after the lapse of many years.

I have here discussed this matter at some length as it involves one of the burning questions of the day in ornithological circles, and have made a number of statements which from lack of space I have not offered proof; yet I have not made a single assertion which has not been based upon facts that I have traced out in some department of animal life. In fact, all I have said is covered by well known laws of evolution, which are familiar to all students who have given the matter proper attention. In closing I give a brief summary of the whole matter.

SUMMARY.

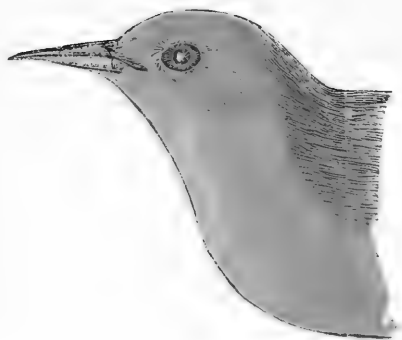
Two forms of birds appearing somewhat suddenly and increasing considerably within a few years have offered problems which have greatly puzzled ornithologists. These forms are known as Brewster's and Lawrence's Warblers. In some ways they appear to intergrade not only with each other but with two other species, namely, the Golden-winged and the Blue-winged Warblers. These peculiarities have been considered by those who have written about them to be due to three causes: 1, Hybridization of the Golden-winged and Blue-winged Warblers; 2, Dichromatism in the same species; 3, Evolution of Brewster's and Lawrence's Warblers from the Golden-winged.

1. Hybridization is improbable, for, even although the so-called hybrids may present all intergrading stages of plumage between the supposed parent species, they do not occur all over the region overlapped by the species of which they are thought to be the offspring; but chiefly because known hybrids among wild birds are rarely fertile, and the hybrids themselves very rarely, if ever fertile when mated together.

2. Dichromatism is also improbable, because the dichromatic phases occur only over a limited area, whereas they should be found over all of the section occupied by both Golden-winged and Blue-winged, local dichromatism being unknown among birds.

3. Evolution appears to be the most natural explanation of the matter, both of the forms in question having been derived from the Golden-winged Warbler; because they both present at least one character in common with the supposed parent; that of the peculiar form of the white spot on the outer web of the second tail feather. That Brewster's and Lawrence's Warblers are unlike is explained by the law of reversion, each form assuming the characters in part of its immediate parents, and in part the characters of some remote ancestor. Limited distribution is in favor of this theory. The appearance of new forms on ground overlapped by the two old species is most likely coincidental. There is nothing in the coloration and other facts regarding the two species in question but what can be accounted for by the action of well known laws of evolution.

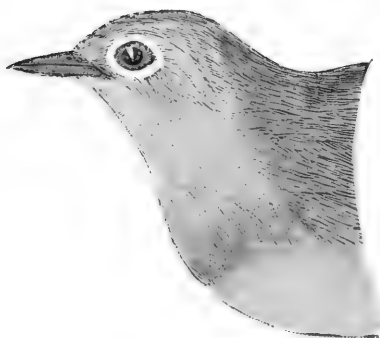
PLATE X.



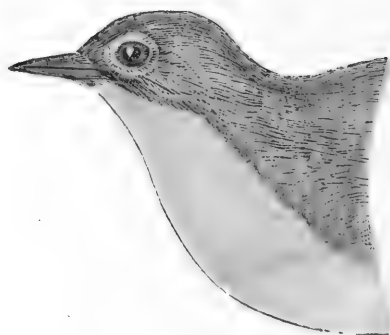
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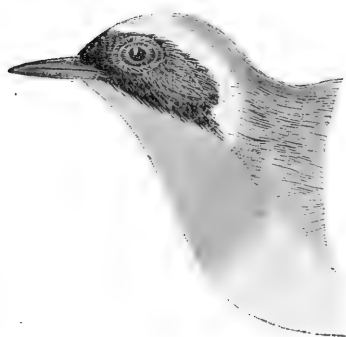
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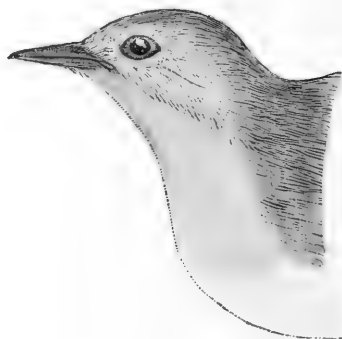
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6

EXPLANATION OF PLATE X.

Prothonotary Warbler, 1, male.

Kentucky “ 2, “

Connecticut “ 3, “ 4, female.

Maryland Yellow-throat, 5, “ 6, “



BLUE-WINGED WARBLER.***Helminthophila pinus.***

Plate VII, Fig. 5, male; Fig. 6, female.

Size, 5.00 to 5.30. Greenish above; yellow beneath; a narrow black patch through eye. Wing bands and tail spots, white. Occurs rather commonly in summer in southern Connecticut, and very casually in Massachusetts.

ADULT MALE. Above, yellowish green. Wings and tail, bluish gray; wing bands usually separated and white. Top of head and lower parts, deep yellow. Under tail coverts, lighter yellow. Line through eye, about its width, black.

ADULT FEMALE. Generally similar, but duller, and with the yellow of the top of the head more or less overwashed with greenish.

DIMENSIONS. Length, 5.00; stretch, 7.00; wing, 2.35; tail, 1.90; bill, .40; tarsus, .95.

COMPARISONS. Readily distinguished by the unmarked under parts, restricted markings about head, and bluish gray wings and tail. The wing bands are sometimes yellowish, or even yellow, and are occasionally so wide as to become fused together as in the Golden-wing. The absence of black throat markings; at once distinguishes this species from Lawrence's Warbler.

NESTS AND EGGS. Nests placed on the ground, composed of weeds, strips of bark, leaves, moss, etc., lined with finer material. Eggs, four to five, oval, white, finely sprinkled with reddish brown, umber, and black. Dimensions, .50 by .65.

GENERAL HABITS. This is one of the few New England Warblers with which I have had a very limited experience, but it does not appear to differ in any marked way from the Golden-wing. The birds inhabit low undergrowth on the borders of woodlands, and are occasionally seen in gardens.

BREEDING HABITS. The nesting site is usually in sections on the margins of woodlands grown up to coarse grasses, weeds, etc., among which the nest is placed on the ground. It is occasionally concealed by overhanging blackberry or other vines. Like the Golden-wing the Blue-wing seems to pre-

fer high land but in the neighborhood of water as a breeding place. The nesting time begins about the second week in May.

SONG. The song of the Blue-winged Warbler differs from that of the Golden-wing in being more forcibly given, and consists of a series of rather wiry but lisping notes emitted as a continuous thrill.

MIGRATION AND BREEDING RANGE. Occurs during the breeding season throughout eastern United States, north to about latitude forty one, but no farther east regularly than southern Connecticut, but west to Iowa. It has been taken in Massachusetts on two occasions, once in Dedham in 1854 and once in West Roxbury, on May 17, 1878. It arrives in early May and leaves for the south in early September. Winters in Mexico, Yucatan and Guatemala and casually in the Bahamas, (Abaco).

B : wing bands and tail spots absent.

ORANGE-CROWNED WARBLER.

Helminthophila celata.

Plate IX, Fig. 1, male ; Fig. 2, female.

Size 4.75 to 5.30. Above uniform grayish olive with the top of the head having usually a concealed spot of dull orange ; beneath uniform grayish yellow. A rare migrant, occurring more often in autumn than in spring.

ADULT MALE. Grayish olive above, with the base of the feathers of the crown dull orange or ochraceous, this color, however, is usually concealed by the tips of the feathers, and more greenish on the rump ; narrow supercilliary stripe, eyelids, and beneath, grayish yellow.

ADULT FEMALE. Very similar, but often, although not always, somewhat duller, with less orange on the crown.

YOUNG. Much more gray than the adults on the upper surface and the yellow beneath is creamy and shows slight dusky streakings on the throat and chest. There are slight whitish wing bands, there is a trace of orange on crown or this may be absent.

NESTLINGS. Grayer than in the young, tinged with rusty on rump and upper tail coverts and with buffy below. There are also buffy wing bars. No traces of an orange crown.

Fig. 41.



Head and second tail feather of Blue-winged Warbler.

DIMENSIONS. Length 4.95; stretch 7.83; wing 2.50; tail 2.00; bill .44; tarsus .70.

COMPARISONS. Readily distinguished from all other members of the genus by the uniform grayish tintings above, without any decided bluish head, and absence of clear yellow beneath, and from other warblers by the plain colors.

NESTS AND EGGS. Nests placed on the ground, composed of grasses, strips of bark, and plant stems, lined with fine grasses, hair, and fur. Eggs four to six, oval, white or creamy-white, finely spotted, chiefly around the larger end, with reddish brown and lilac. Dimensions, .64 by .46.

GENERAL HABITS. The Orange-crowned Warblers are not uncommon in Florida in winter, frequenting alike the low scrub and higher trees of the hammocks. I have even seen them in the shade trees of the city of Jacksonville. I once saw one in low oak woods, at Williamsport, Pennsylvania. They are lively little birds, and differ from most members of this genus in keeping well in concealment.

BREEDING HABITS. This bird breeds in the far north. It is said to place its nest on the ground among bushes, concealed among dry leaves.

SONG. I have never heard the song, but it is said to consist of a low, sweet thrill, ending with a lisping note. In winter it utters a sharp chirp.

MIGRATION AND BREEDING RANGE. Breeds mostly north of the United States, as far as Alaska but also southward along the mountains to New Mexico. During migrations it is found rarely in New England. It has been obtained in Massachusetts on four occasions, once at Springfield in May, 1863, once at Concord in October, 1876, once at Belmont in the autumn of 1886 and rather singularly, at Lynn, on January 1, 1876. I shot a single specimen at Williamsport, Pennsylvania, on May 15, 1876. The farthest north that I have found it in autumn was at New River North Carolina, where a female, now in my collection, was obtained on November 11, 1900. It occurs in winter in Florida from Jacksonville to Miami, but more frequently in the interior than on the coast. It also winters in Eastern and Central Mexico.

NASHVILLE WARBLER.

Helminthophila rubricapilla.

Plate IX, Fig. 3, male; Fig. 4, female.

Size, 4.55 to 5.30. Greenish above; head, bluish, with a partly concealed patch of chestnut; beneath yellow. Rather common in summer all over New England.

ADULT MALE. Above, greenish-olive, brightest on rump; head and hind neck, bluish-gray, with crown, excepting tips of feathers, chestnut. Beneath, yellow, abdomen white. Ring around eye, white.

ADULT FEMALE. Similar to male but duller above and below, while there is less chestnut on the crown.

YOUNG. Have the head and back brownish instead of ashy; there is a brownish suffusion over the back: the yellow beneath is quite pale, with an ashy suffusion on the throat, and the head lacks the chestnut crown.

DIMENSION. Length, 4.75, stretch, 7.50; wing, 2.25; tail, 1.70; bill, .40; tarsus, .60.

COMPARISONS. This is the only warbler which we have without wing bands and tail spots, that has a bluish head, greenish back and yellow under parts.

NESTS AND EGGS. Nests, placed on the ground, composed of moss, grasses, strips of bark etc. and lined with finer grasses and sometimes hair. Eggs, four or five in number, oval, varying from white to creamy, finely spotted and dotted, often more thickly on the larger end, with brown of varying shades and lilac. Dimensions, .62 by .50.

GENERAL HABITS. The Nashville Warblers are fairly common during migration in Massachusetts, at which time they may be found almost anywhere in woodlands, especially along their borders, or they will sometimes visit orchards and hedgerows at this time. During summer, when they are less common, and rather local in distribution, these warblers are fond of open places in woodlands, or they may be found on the outskirts of woods. They will return year after year to a favorite spot. I knew several such spots in past years, and never failed to find the birds there, but of late years so many changes have been made by cutting away the timber that the warblers have been driven away in many cases. As an example, however, of the persistency with which these birds cling to a chosen spot I can point to a certain cup-like hollow among the hills in Waverly. This little valley is overgrown with birches on its sides, and lower, where a stream flows through, are alders. Higher nearer the hill tops, are a few larger trees that rise above the others. On some one of these trees any day in summer I can find a Nashville Warbler, and I have found either the same birds or their ancestors on the same trees every summer for nearly forty years. The reason for this continuous occupation on the part of the birds is due to the fact that the changes which have occurred in this immediate vicinity have been gradual, in other words, natural changes. When I first knew the little valley it was an open pasture, in which grew a few scattering huckleberry bushes, among which, later, sprang up the gray birches which are now there. The Nashvilles have paid no

attention to these slow changes, and have always remained in the valley, while there is no reason why they will not always be found there until the trees upon which the males delight to perch are removed.

The Nashville Warblers are restless birds and the males, although they have their favorite trees on which they perch, do not remain long on any one, but constantly fly from one to the other. The valley of which I have spoken is surrounded by a scattering fringe of moderately high trees, and the pair or two of warblers that occupy the place will pass from one tree to another, completely around the depression, many times during the day. It is useless for the observer to attempt to follow one, for it will be sure to make the usual round, and thus always keep ahead of its pursuer. The best way to secure a good sight of the bird will be to remain quietly beside any of the trees upon which the warbler has been seen to alight and await its return.

The females, although hard to find during the nesting season may also be seen on the same trees on which their mates perch, but they too are restless, and seldom remain long in one tree.

BREEDING HABITS. The nests of the Nashville Warblers are placed on the ground, often on the border of a wood, especially if such a border chances to be on a hillside. The nest is never easy to find, as it is generally carefully concealed, and the female remains on it until nearly trodden upon. The best way to find the nests of all ground breeding birds is to watch the female, if she can be seen away from the nest, as she will soon return to it, this being especially true when she is building.

SONG. The opening song notes of the Nashville Warbler always remind me of those of the Indigo Bird for they consist of five or six harsh, quite rapidly given notes. These are followed by about three notes given in quite a different tone, and ending very abruptly, thus the variation between the first

and second part of the song is quite marked. This is the usual summer song. Earlier in the spring, just after its arrival from the south it gives a more continuous lay, one which is not as energetically uttered. I find some authors are inclined to think the song of the Nashville like that of the Chestnut-sided, but I do not find the usual songs uttered by the respective species at all alike; the truth is, however, that the Chestnut-sided gives a song, oftener late in June than at any other time (occasionally this song is given in May), that is so nearly like that of the Nashville Warbler that I have frequently been deceived by it. See pages 67-8 for remarks regarding this song of the Chestnut-sided. The Black and White Creeper also has a song quite like that of the Nashville Warbler. The alarm note of the Nashville is a sharp chirp and sometimes they utter a kind of clicking sound when they are disturbed.

MIGRATION AND BREEDING RANGE. The Nashville Warbler breeds all over New England, but it is less common in the southern portion than in the northern. It breeds west as far as the Mississippi and north to Grand Menan and the Great Slave Lake district. It has been taken twice in Greenland, but many years ago. It winters in eastern Mexico and Guatemala, and on the migrations thus passes through the middle districts of the United States more commonly. A single specimen was taken at Jacksonville, Florida, on March 22, 1869. I found one in Williamsport, Pennsylvania, on May 12, 1876, and a few at Watsonstown on September 22, 1875. The majority do not arrive in Massachusetts until about May 8. Most all leave early in September.

TENNESSEE WARBLER.***Helminthophila peregrina.***

Plate IX, Fig. 5, male; Fig. 6, female.

Size 4.50 to 5.00. General colors, above greenish, with top of head ashy gray, Beneath white.

ADULT MALE. Top and sides of head ashy gray; remainder of upper parts olive-green brightest on the rump. Beneath white, faintly tinged every where but more especially on the sides with greenish olive. Eyelids and lines on eye whitish. There is a dusky line from bill to eye. Outer tail feather, with a spot of white on the inner web near the tip.

ADULT FEMALE. Similar to the males but duller; and the under parts are more strongly tinged with greenish.

YOUNG. More strongly tinged everywhere with greenish yellow, especially beneath.

DIMENSIONS. Length, 5.00; stretch, 7.75; wing, 2.45; tail, 1.70; bill, .40; tarsus, .70.

COMPARISONS. Known by the plain colors, and white under parts, and absence of any bright patch on crown.

GENERAL HABITS. The first specimen of the Tennessee Warbler that I ever saw was at Newtonville, Massachusetts, where I obtained four males between May 18 and 24, 1869.

They were all in apple trees, among the branches of which they were actively searching for insects. It was not until the following spring, 1870, that I became very familiar with the species. At that time I found them common at Upton, Maine, where they usually frequented the tops of high forest trees. They are restless little birds, and it is difficult to find one quiet for a moment, and in this way they resemble the Nashvilles.

BREEDING HABITS. In the early summer of 1870, the Tennessees that I found at Upton were undoubtedly breeding, for the females on one or more occasions were observed flying about close to us and chirping loudly. All of our efforts to discover the nests proved futile. These warblers continued





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common at Upton in summer until 1875, when they disappeared. They still breed, however, in other portions of Northern New England. Recently nests have been discovered in Canada.

SONG. During migration I have never heard the Tennessee Warbler sing, but on their breeding grounds at Upton they were in full song. The lay resembles that of the Nashville somewhat, inasmuch as it has two parts, but the first is more divided and the last shriller. The male when singing is usually perched on the top of a high tree.

MIGRATION AND BREEDING RANGE. The Tennessee Warbler breeds throughout Eastern North America from the latitude of Northern New England northward. Dr. Faxon records seeing it on Mount Graylock, Massachusetts, at an elevation of 3,000 feet, on July 15 and 16, 1888, thus it may breed there. In migration it passes through Massachusetts in spring from May 10 to the 30; in autumn, from late August until early September. On September 7, 1875, I found it at Watertown, Pennsylvania, and saw it as late as the 22, but it was not common at any time. I have never seen this species south of Massachusetts in spring. Winters in eastern Mexico, Central America, and northern South America (Columbia and Venezuela). Accidental in Cuba.

GENUS. ORANGE WARBLERS. PROTONOTARIA.

Size, large, 5.30, colors, bright, greenish above, orange on head and beneath. No wing bands, tail spots present. Bill, nearly as long as head, slightly curved and sharp. Wings, rather long, reaching when folded to the middle of the tail. Feet, weak.

The only species of this genus is remarkable on account of its bright orange color, with no conspicuous black markings. The under tail coverts are long, reaching within .50 of the tip of the tail. Southern in distribution, thus accidental as far north as New England.

PROTHONOTARY WARBLER.***Protonotaria citrea.***

Plate X, Fig. 1, male.

Size, large, 5.30 to 5.50. Yellow beneath and on head; golden olive on back. Much white on tail. A common summer resident in the south; accidental in New England.

ADULT MALE. Head, neck and under parts, excepting under tail coverts, which are white, rich yellow, (varying from lemon to cadmium) brightest anteriorly. Above, golden olive. Wings, rump and tail, bluish gray; a greater portion of the inner webs of all the tail feathers, excepting central pair, white.

ADULT FEMALE. Much paler, with the greenish of the back extending over top of head, and the flanks and abdomen are whitish.

YOUNG. Similar to the adult female, but even duller, and there are two indistinct wing bars.

NESTLINGS. Have the yellow replaced by olive, with the wings and tail as in the young.

COMPARISONS. Distinguished at once by the prominent orange yellow color and large size.

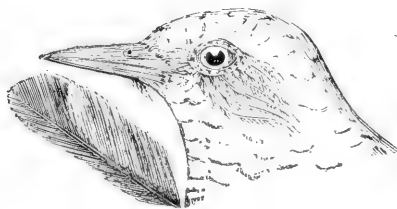
DIMENSIONS. Length, 5.40; stretch, 8.80; wing, 2.85; tail, 2.00; bill, .55; tarsus, .65.

NESTS AND EGGS. Nests placed in holes in stumps or trees, composed of mosses, grasses, leaves, straw, etc., lined with finer grasses and hair. Eggs, five or six in number, rarely seven and very rarely eight, elliptical or rounded oval, sometimes nearly spherical, creamy white, heavily and thickly spotted and blotched with dark reddish brown, purple and lilac, the spots being often nearly confluent on the larger end. Dimensions, .72 by .55.

GENERAL HABITS. As my experience with this beautiful bird has been very limited, for I have met with it only once, on the Island of Eleuthera, Bahamas, I can add but little to its history. It is said to inhabit swamps, but the one I obtained was feeding in an orange tree on high ground.

BREEDING HABITS. The habit of placing the nest in holes and cavities of stumps and trees and even about houses is peculiar, and is shared by only one other known species of Warbler, Lucy's, a species found in the west. I have a nest obtained for me by Miss Belle S. Thursby in the vicinity of Blue Spring, middle Florida, on May 27, 1901.

FIG. 42



Head and outer tail feather of Prothonotary Warbler.

SONG. The only specimen of the Prothonotary Warbler that I ever saw alive was silent, but Mr. Wm. Brewster has written an excellent account of the musical efforts of this species, which I take the liberty of quoting. "The ordinary song is a loud *peet, tweet, tweet, tweet*, varied to a *peet, tsweet, tsweet, tsweet*, or *tsweet, tr-sweet, tr-sweet, tr-sweet*. At a distance the notes resemble those of the Spotted Sandpiper, but near at hand they possess a peculiar penetrating quality. The bird has another and very different song, which it utters while flying slowly with a trembling, fluttering motion of the wings, carrying the head high and the tail spread. Although so low and feeble as to be inaudible many rods away, this song is very sweet. It somewhat resembles the song of the Canary, given in an undertone with trills or water notes interspersed". (Foot note in Second Edition Minot's Land and Game Birds of New England, page 90.)

MIGRATION AND BREEDING RANGE. The Prothonotary Warbler breeds throughout the southern portion of Eastern United States from middle Florida and eastern Texas north to

Virginia, southern Ohio and across to southern Michigan.

Casualty it occurs in New England, and has been taken several times in Massachusetts, and has even wandered as far north as Maine and New Brunswick. Winters in eastern Mexico, Central America, Columbia, Venezuela, and Trinidad. The only migration record that I can give is the specimen taken on Eleuthera at the Current Settlement, on April 20, 1897.

GENUS. BUFF-COLORED WARBLERS. HELMITHEROS.

Bill large and stout, a little shorter than the head. wings, rather long and pointed. Feet, rather large.

FIG. 43.



Worm-eating Warbler.

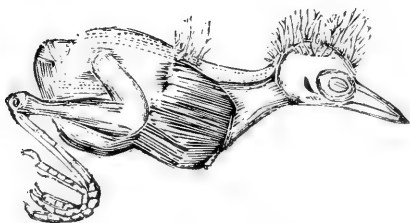
Dull colored Warblers with the top of the head conspicuously marked with four black stripes enclosing three of buff. Keel rather high, exceeding one half of the width of the sternum. Coracoids equal in length to the top of the keel. Sexes similar. Tongue, thick and fleshy much like those of many sparrows and without bristles at tip. One species, which is rather southern in distribution, thus barely reaching New England.

WORM-EATING WARBLER.*Helmitheros vermivorus.*

Plate VI, Fig. 6, male.

Size, rather large, 5.00 to 5.50. Greenish above; head and lower parts buffy, the former having four broad stripes of black. Occurs in woodlands in summer in southern Connecticut; accidental in Massachusetts.

FIG. 44.



Young Worm-eating Warbler.

ADULT. Greenish above; head and under parts, buff, lighter on abdomen. The head has a narrow black stripe through eye and two broader ones on the crown, thus enclosing three buff stripes.

YOUNG. Browner above, with the black head stripes replaced by brown, and the wing coverts are broadly margined with buff.

DIMENSIONS. Length, 5.35; stretch, 8.25; wing, 2.55; tail, 1.50; bill, .50; tarsus, .62.

OBSERVATIONS. Readily distinguished from all other warblers by the plain colors, unmarked, buffy under parts, and conspicuous black stripes on head.

NESTS AND EGGS. Nests placed on the ground, composed of dried grasses, leaves and fibrous roots. Eggs, usually five, sometimes four and rarely six, rather elliptical, white, plentifully sprinkled and dotted everywhere, but rather more thickly on the larger end, with reddish brown. Dimensions, .55 by .75.

GENERAL HABITS. Late in May, 1876, I found the Worm-eating Warblers common in the White Deer Valley, near Wat-

sontown, Pennsylvania. They spend a greater portion of their time on the ground or feeding among low shrubbery near it. They are very agile birds, securing the insects which they are pursuing with the greatest ease. Those which I have seen in winter in Florida, Bahamas and in the West Indies appeared to feed near the ground, only occasionally venturing among the branches of the trees.

BREEDING HABITS. The Worm-eating Warblers were breeding in White Deer Valley late in May, 1876. I found several nests, all placed on the ground, on the slope of the hills but never far up from the bottom of the valley; they were in open sight, being placed among the fallen leaves of the previ-

FIG. 45.



Wing of young Worm-eating Warbler.

ous year, without any attempt at concealment. The eggs were all deposited by the last week in May, and in a few cases I found the young well grown by June 7. The young appear to acquire their wing feathers more quickly than do most warblers. This precocity is probably directly connected with the ground nesting habit, for the young of the Black and White Warbler and of the Golden-wing fly early. The young are in greater danger when on the ground than among the foliage, hence, through the survival of the earliest flyers, the species acquire the power of flight sooner than shrub or tree nesting warblers. At Fig. 44 is given a cut of the young of the Worm-eating Warbler and at Fig. 45, of its outstretched wing, showing the development of the quills.

SONG. The song of the Worm-eating Warbler is not very musical, for it consists of a few feebly uttered chirps, not unlike those of the chipping sparrow. This song is given as the bird moves about the low shrubbery in search of food. The alarm note is a low chirp.

MIGRATION AND BREEDING RANGE. Worm-eating Warblers breed throughout eastern United States from southern Connecticut, about Saybrook, Gale's Ferry, and New Haven, southeastern New York, Lower Hudson Valley, and southern Wisconsin, southward. On January 28, 1872, I shot a specimen at Blue Spring, Florida, and saw a few others. The same year, a little later, I found it common at Salt Lake, further up the St. Johns River, and even heard the song. On January 29, 1884, I saw one at Nassua, Bahamas, another at the same place on February 15 and two more on April 8, one of which I shot. Judging from the dates on a number of skins in the museum of the Institute of Jamaica at Kingston the species must be common on the island all winter. I shot a single specimen on the Island of Cayman Brac on April 5, 1885. It is recorded from Inagua and Cuba also from eastern Mexico and Central America.

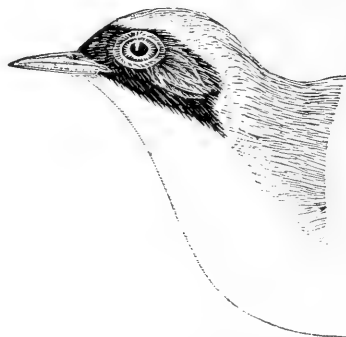
GENUS. YELLOW-THROATED WARBLERS. GEOTHLYPIS.

Size, variable, from 4.00 to 5.50. Colors, olive above, throat and breast yellow, conspicuous black mask on face. No wing bands or tail spots.

Bill shorter than head and rather stout. Wings, short and rounded. Tail, also rounded. Feet, large. The sternum of this genus is remarkable, inasmuch as it is produced forward in a degree quite noticeable, the coracoid bones being longer and proportionally stouter than in any other genus in the family, and the keel is low, not being higher than one-

half of the width of the sternum. (See Fig. 9, B, page 5.) The species are mostly sub-tropical, a few occur in the south temperate portion of North America, and one species and one sub-species have extended their range further northward, reaching New England.

FIG. 46.



Head of Maryland Yellow-throat.

MARYLAND YELLOW-THROAT.

Geothlypis trichas.

Plate X; Fig. 5, male; Fig. 6, female

Size, rather small, from 5.10 to 5.25. Olive green above; prominent black mask on face; throat and chest yellow. Rhode Island and possibly the southern portion of Connecticut, in summer.

ADULT MALE. Grayish olive above. Forehead and sides of head, black, bordered behind by whitish, thus forming a mask on face. Throat and chest, lemon yellow. Under tail coverts, paler yellow. Remaining under parts, buffy white.

ADULT FEMALE. Similar in general coloration, but lacks the black mask and whitish of head, and the yellow beneath is much duller.

YOUNG MALE. Similar to the adult female, but shows more or less traces of the black mask, especially below the eye.

YOUNG FEMALE. Differs from the adult in having very little trace of yellow below, and in having the top of the head decidedly brownish.

NESTLINGS. Similar to the young female, but browner above, with indistinct wing bands of buff, and with buff on throat, chest, and sides.

DIMENSIONS. Length, 5.10; stretch, 7.00; wing, 2.00; tail, 1.70; bill, .42; tarsus, .64.

COMPARISONS. Readily distinguished from all other of our warblers, excepting the next, by the short wings, their tips folding at the base of the tail, plain colors above and yellow throat; the adult males may be further distinguished by the black mask.

GENERAL HABITS. For general and breeding habits, account of nests and eggs see these subjects under Northern Yellow throat, all of which will answer for those of this species.

MIGRATION AND BREEDING RANGE. I have now added this species to the fauna of New England on the strength of an adult male in my collection taken at Centerdale, Rhode Island, May 18, 1898, by Mr. F. P. Drowne. In the same collection were specimens of the common northern Yellow-throat. Occurs regularly during the breeding season from southern Pennsylvania, Virginia, and Maryland, southward. I have a young male taken at New River, North Carolina, December 15, 1900, by the Maynard-Pratt Expedition; also winters in the Bahamas.

NORTHERN YELLOW-THROAT.

Geothlypis trichas brachidaactyla.

Plate XI, Fig. 1, male; Fig. 2, female.

Size, larger, from 5.25 to 5.75. Colors darker than in the last, with the yellow beneath much more extended.

COMPARISONS. Decidedly darker above than in the Maryland Yellow-throat; the yellow beneath is deeper in shade, and extends over nearly the whole lower surface. This form has been recently separated from the southern species.

DIMENSIONS. Length, 5.25; stretch, 7.25; wing, 2.25; tail, 2.10; bill, .50; tarsus, .57.

NESTS AND EGGS. Nests placed on or near the ground, composed of dried grasses, leaves and weeds, lined with finer grasses and sometimes

with feathers. Eggs, usually four, some times five, pure white, spotted and blotched everywhere, but rather more thickly on the larger end, with brown and lilac. Dimensions, .68 by .52.

GENERAL HABITS. The Northern Yellow-throats are one of our most common warblers. They are fond of swampy thickets, and may be found anywhere in them from the borders of the cranberry bogs of Cape Cod, along the streams and ponds elsewhere in Massachusetts, in the solitudes of the northern woodlands to the quaking marshes of the Magdalen Islands. It matters not to the birds of what these thickets are composed as long as they are dense enough to form a perfect shelter for them. It is fortunate for those who wish to see these Yellow-throats that they are inquisitive little birds, and will always try to catch sight of their visitors, for so closely do they keep concealed that were it not for this habit they would be seldom seen.

One has, however, only to do something to attract their attention, like mimicking their harsh alarm notes, which may be accomplished by making a kissing or squeaking sound by placing the back of the hand or a finger to the lips. When the birds hear this sound they will almost invariably answer with their alarm notes, then after a moment or two will appear. Their curiosity is easily satisfied, and after a glance or two at the intruder they will dive into the fastness from which they emerged to be seen no more at that time. Occasionally a Yellow-throat may be seen feeding among the branches of a tree if it grows out of a jungle or stands near one. Now and then one of these birds will venture into an orchard if this be bordered by a thicket.

As remarked, here in the north the Yellow-throats prefer shrubbery that grows in the low lands but in winter in Florida, more especially in the Bahama Islands, they are found in low bushes often in places remote from fresh water. This at first sight may appear singular, but when we find that the

several species of Yellow-throats which occur on the Bahamas are all, without exception, inhabitants of more or less thick jungles which grow on high land, we can better understand this winter habit of our species. They merely return to a primitive habit of the form from which they originated whenever they visit their ancestral home.

BREEDING HABITS. The Yellow-throats place their nests on or near the ground in their favorite thicket or near it. Sometimes it is built in a tussock of sedge, or it may be placed in a sheltering fern, or among low herbage, but wherever it may be it is usually carefully concealed, and hence difficult to find.

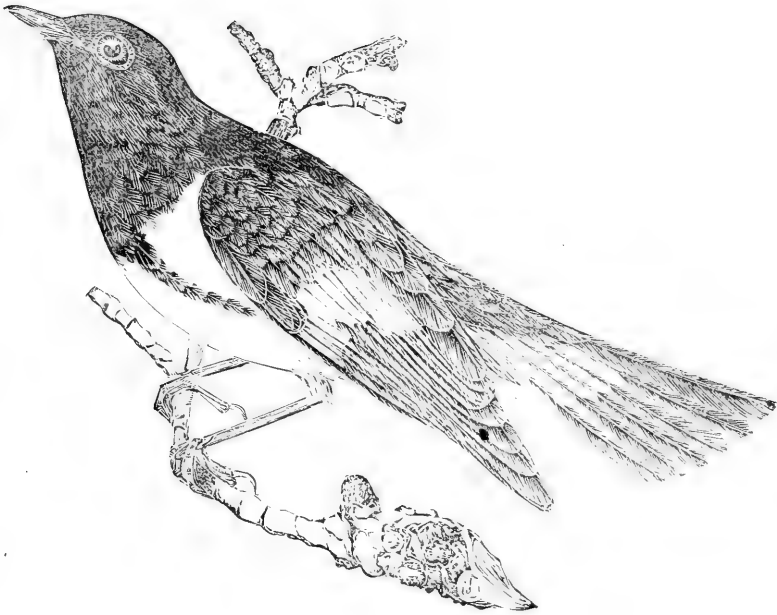
Nest building begins about the middle of May, and the eggs are deposited by June 1. The newly fledged young may be seen following their parents the first week in July, and after the nestlings are old enough to care for themselves the family remains together until the species migrates.

SONG. The ordinary notes of the Yellow-throat are well known, being very characteristic and are thus easily recognized. These notes may be expressed by the syllables, "*wich-iry wichity wichity*". Sometimes it is, "*witchity wichity witch*", and often the song is shortened by the omission of a note. The song is given quite deliberately and in about the same tone from first to last, and in this way differs from the call song of the Ovenbird which is suggested by it. Both of the songs begin abruptly, and both are so loud as to attract the attention of even a casual observer, but instead of being deliberately uttered and in having the same tone throughout, as in the Yellow-throat, the Ovenbird gives its lay with increasing rapidity and volume as it proceeds. Both songs are call songs, and the Yellow-throat, like the Ovenbird, gives its true song rather rarely and always while hovering. The bird rises from its favorite thicket, flies obliquely upward to the height

of about ten feet, then flutters obliquely downward, giving a peculiar warbling note as it descends. This hovering song is not, however, as musical as the vesper song of the Ovenbird, in fact, although it varies somewhat with individuals, it is rather harsh. It begins and ends abruptly. It is noteworthy that the hovering songs of both of these species sometimes begin with two or three notes of the call song. Besides these two ways of singing, the Northern Yellow-throat, at least, gives another peculiar series of notes. These are rapidly uttered and closely resemble the clicking of the ratchet on the main-spring of a watch when it has become detached from its escapement and is running down. These are probably used as notes of alarm or of warning, and although rather infrequently emitted ordinarily, I have heard them given repeatedly during wet weather. The bird while uttering them is almost always wholly concealed; thus I have never been quite certain whether they are produced by one or both sexes. The chirp of alarm is harsh, rather more so than that of any other of our warblers. Indeed, this harsh alarm note appears to be characteristic of all other members of the Yellow-throat genus which I have heard, five or six in number, all natives of the Bahama Islands. While this is true in regard to the alarm notes, the songs of some of these birds are very sweet, and, although none of them are loud, they have a penetrating quality that enables them to be heard at a considerable distance. These songs also have a peculiar intonation, which, although some differ greatly from that of our species, recall at once the notes of the Northern Yellow-throat. I have never heard the hovering song given by any of the Bahama species.

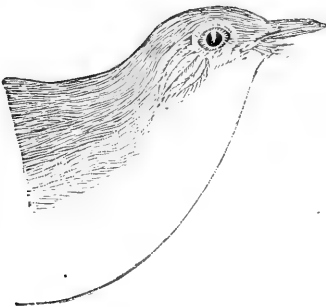
MIGRATION AND BREEDING RANGE. The Northern Yellow-throat occurs in summer from northern New Jersey northward to southern Labrador. It is common in winter in the Bahamas, Cuba, and Jamaica, and from Eastern Mexico to Guatemala. In migration it passes over the whole of the Uni-

FIG. 48.



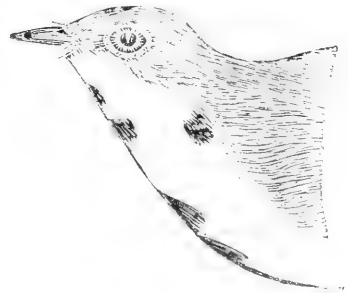
Adult male Redstart.

FIG. 49.



Female Redstart.

FIG. 50.



Young male Redstart.

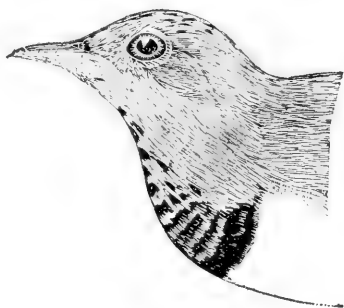
ted States east of the Great Plains. It arrives in Massachusetts the first week in May, but lingers in autumn rather later than many of our warblers, often until the latter part of October, and it has been found two or three times in eastern Massachusetts in winter.

GENUS. ASHY WARBLERS. CINEROSA.

Size, uniform, 5.50. Colors, olive above; throat and breast, ashy mixed with black; remaining under parts, yellow. No wing bands or tail spots.

Bill, shorter than head. Wings of medium length; when folded the tips reach beyond the base of the tail, but not beyond its middle, not rounded, the four outer quills being about the same length. Tail, somewhat rounded, with the under coverts reaching beyond its middle. Sternum, much as in *Geothlypis*, with a low keel and long coracoids. Two known species occur in temperate North America, of which one breeds in northern New England.

FIG. 47.



Mourning Warbler.

Members of this genus have usually been placed by authors with the Yellowthroats (*Geothlypis*), and by Mr. Ridgeway, in his *Birds of North and Middle America*, with the Long-winged Warblers (*Oporornis*) but I do not see as they can be consistently placed with either group, thus I have formed a separate genus for them.

MOURNING WARBLER.***Cinerosa philadelphia.***

Plate XI, Fig. 3, male; Fig. 4, female.

Size, 5.00 to 5.75. Greenish above; head and throat, ashy, mixed with black. A rare migrant, at least, through eastern New England, but breeds commonly in the northern portions.

ADULT MALE. Rather dark olive green above, becoming dark grayish ash on head. Space in front of eye nearly black. Beneath yellow, with the throat and chest ashy, more or less mixed with black, especially on the breast.

ADULT FEMALE. Similar in general coloration, but with the ashy of the head and neck replaced by smoky gray, and the yellow of the under parts is usually somewhat paler.

NESTLINGS. Reddish brown above and very much lighter on the lower surface.

DIMENSIONS. Length, 4.35; stretch, 7.80; wing, 3.45; tail, 1.90; bill, .42; tarsus, .90.

COMPARISONS. Distinguished from most warblers by the ashy, black-mottled breast in the male, and from the male Connecticut by the absence of the white ring around the eye and shorter wings in both sexes. The female Mourning differs from the female Maryland in having the smoky brown breast.

NESTS AND EGGS. Nests placed on or near the ground, composed of grass, fine strips of bark and similar material, lined with hair and fine grass. Eggs, three or four, oval, creamy or white, blotched, dotted and spotted with reddish brown, umber and lilac. Dimensions, .68 by .54.

GENERAL HABITS. The Mourning Warbler does not differ greatly in many of its habits from the Maryland Yellowthroat. Like this species it is fond of thickets, but not often in low lands, preferring those along fence rows, stone walls and on the margins of woodlands, where it conceals itself very expertly. I found the birds common at Upton, Maine, in June, 1871, and, although I frequently heard the males as they

sat singing on some slightly elevated shrub or fence post, I seldom saw the females. During migration both sexes are very retiring, keeping well in the shelter of the thickets.

SONG. The Mourning Warbler has a loud, clear, and pleasing song, suggesting that of the Water Thrush.

MIGRATION AND BREEDING RANGE. I obtained a male Mourning Warbler at Williamsport, Pennsylvania, on May 16, 1876. It passes Rhode Island from the middle to the last of May, and occurs in eastern Massachusetts about the same time. I have seen it here as late as June 2. It breeds from northern New England northward into Canada; southward along the mountain ranges to the Berkshires, where it is not uncommon in some sections, thence to Pennsylvania and West Virginia. In autumn it passes us in September, but is then much more rare than in spring. It winters in Nicaragua, Costa Rica, and northern South America.

GENUS. LONG-WINGED WARBLERS. OPORORNIS.

Size, uniform, 5.50. Colors, olive above; yellow beneath. No wing bands or tail spots. Folded wings, reaching beyond middle of tail.

Among the most robust of the warblers. The wings are pointed, the first or second quill being the longest. Bill, stout and conical. Feet, large, indicating the ground living habits of the species. Keel, high, but the coracoids are shorter than in the last two genera. This sternal structure is characteristic of birds of strong flight. Two species, both being found with us; one, as a migrant, breeding north of us; the other, as an accidental visitor from the south.

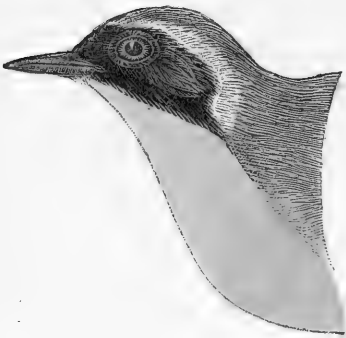
CONNECTICUT WARBLER.

Oporornis agilis.

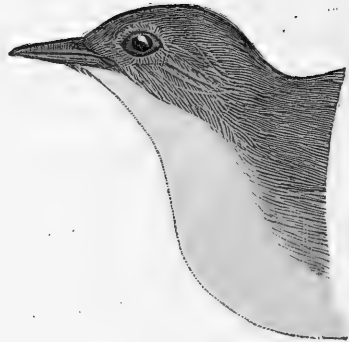
Plate X, Fig. 3, male; Fig. 4, female.

Size, 5.40 to 5.50. Greenish above; head, throat and breast ashy, mixed with black. A white ring around eye.

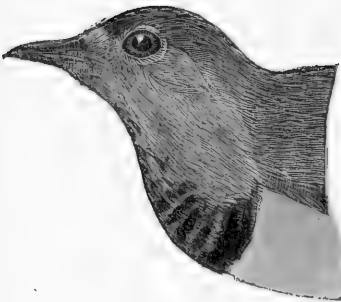
PLATE XI.



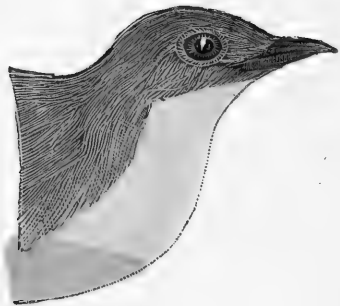
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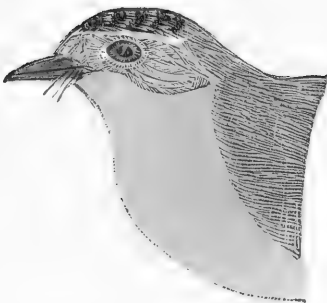
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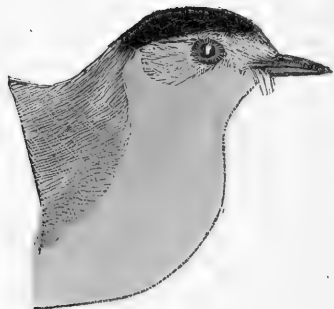
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EXPLANATION OF PLATE XI.

Northern Yellow-throat, 1, male; 2, female.

Mourning Warbler, 3, “ 4, “

Wilson’s “ 5, “ 6, “

Moves its tail up and down frequently. A very rare migrant in in spring; more common in autumn.

ADULT MALE. Above, dark olive green. Head, throat and breast, ashy gray, more or less mixed with black; yellow beneath elsewhere. Eye ring, white.

ADULT FEMALE. Similar in general coloration, but with the ashy of the head and neck replaced by greenish gray, becoming somewhat buff beneath.

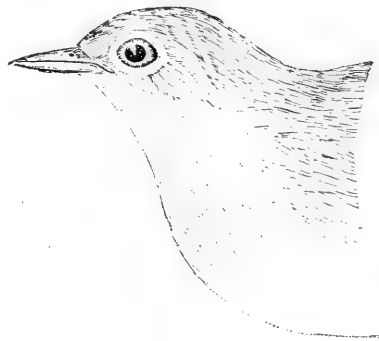
YOUNG MALE. Similar to the adult female, but the color of the head is more slaty.

YOUNG FEMALE. Quite similar to the young male, but the throat and breast are more strongly tinged with buffy, and the top of the head is nearly uniform in color with the back.

DIMENSIONS. Length, 5.45; stretch, 8.80; wing, 2.85; tail, 2.10; bill, .40; tarsus, .70.

COMPARISONS. Known by the large size, long wings, ashy or buffy breast, and white ring around eye.

FIG. 51.



Connecticut Warbler.

NESTS AND EGGS. Nests placed on the ground, composed of fine dry grass. Eggs, four, oval, creamy white, with a few spots of black, brown, and lilac. Dimensions, .75 by .56.

GENERAL HABITS. The life histories of a number of our warblers are but imperfectly known, and one of the most noteworthy of these is the Connecticut, of which comparatively lit-

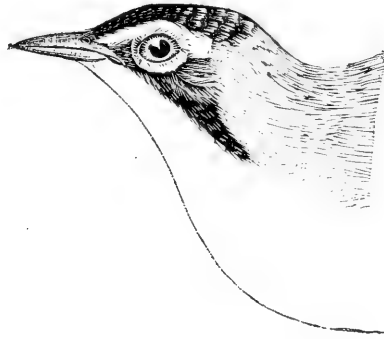
tle has been learned. We know that it is an exceedingly rare spring migrant with us, but is more common in autumn, and during some seasons is even locally abundant. Thus it has been found in considerable numbers in the Fresh Pond Marshes, Cambridge. I have also found it rather common in Newton. It is a ground-living species, and in general habit quite closely resembles the Water Thrush; like that species it may be seen moving rather leisurely about the muddy borders of ponds in swampy locations in search of food. I have occasionally seen it in trees, and two or three years ago I saw one sitting on a large limb of an apple tree that stands back of my laboratory. When perching or moving on the ground the bird usually rather slowly raises and lowers its tail.

SONG. In May, 1890, I saw a Connecticut Warbler near my place in West Newton and watched it for some time, for it was very tame. My attention was attracted to it by hearing its song, which was a low, but exceedingly sweet, warble, quite prolonged, and uttered at rather wide intervals. This may, however, have been a practicing song, for Mr. Ernest E. Thompson, who discovered a nest near Carberg, Manitoba, on June 21, 1883, says, the notes "are somewhat like the song of the Ovenbird, but different in pitch throughout." His rendering of the lay is, "*beechee-beechee-beechee-beechee-beechee-beechee*". Another type given is, "*fru-chapple fru-chapple fru-chapple what*, - - - - uttered in a loud, ringing voice." (Proc. U. S. Nat. Mus., Vol. XIII, 1900, pp. 621-22.)

MIGRATION AND BREEDING RANGE. The few specimens that have been found in New England have occurred in May. In autumn the bird passes through Massachusetts in September, much more commonly from the middle to the last of the month. I have found it once only outside of our limits; at Watsontown, Pennsylvania, September '22, 1875. There is one spring record from the Bahamas; Cay Sal, May 7. It breeds, as far as is positively known, in Manitoba only, but may

also possibly find a summer home in Ontario and Minnesota. Probably winters in northern South America.

FIG. 52.



Kentucky Warbler.

KENTUCKY WARBLER.

Oporornis formosa.

Plate X, Fig. 2, male.

Size, 5.15 to 5.50. Greenish above; yellow beneath; top of head and triangular patch on cheeks, black. Accidental in Massachusetts, Rhode Island, and Connecticut.

ADULT MALE. Above, uniform greenish. Top of head, black, with some of the feathers, especially those behind, tipped with grayish. Beneath, yellow, with a triangular patch on sides of head beneath eye, extending to base of bill, and in a point down sides of neck, black. This leaves a narrow but distinct yellow line over eye.

ADULT FEMALE. Often so similar to the male as to be indistinguishable from him, but sometimes with more grayish on top of head.

NESTLINGS. Pale sepia brown above, with brownish wing bands; beneath, brownish, palest on chin and throat, with the abdomen and under tail coverts, pale buffy yellow.

DIMENSIONS. Length, 5.45; stretch, 8.70; wing, 2.60; tail, 2.00; bill, .45; tarsus, .85.

COMPARISONS. Known by the uniform yellow under parts, and the triangular black patch on the side of head.

NESTS AND EGGS. Nests placed on the ground in thickets, composed of leaves and grasses, lined with finer grasses, rootlets, and horse hair. Eggs, four or five, rarely six; white, irregularly sprinkled, spotted, and dotted with burnt umber, cinnamon, and lilac, often more thickly on the larger end. Dimensions. .69 by .56.

GENERAL HABITS. Judging from published accounts of the habits of this species, they do not differ greatly from those of the Connecticut Warbler, for the bird is found in swampy thickets, where it runs about on the ground, raising and lowering its tail much as does the Water Thrush.

BREEDING HABITS. The nests are built in the swamps frequented by the birds, and the eggs are laid by the last week in May. Sometimes the nest is hidden among the growing grass and weeds, but at other times it is placed among the fallen leaves of the previous year, without other concealment.

SONG. Col. N. S. Goss, in his *Birds of Kansas*, says, "The song is loud and clear and resembles that of the Maryland Yellow-throat."

MIGRATION AND BREEDING RANGE. The claims of the Kentucky Warbler to a place in our fauna rests upon the following statements:- a specimen recorded by Dr. Holder as having been taken at Lynn, Massachusetts, a number of years ago, and said to be in the collection of the Lynn Natural History Society (see Maynard, *Quart. Jour. Boston Zool. Soc.*, Vol II, No. 3, pp. 43-44); a specimen recorded by Messrs. Howe and Sturtevant in their *Catalogue of the Birds of Rhode Island*, 1899, page 81, as having been seen by Lieut. Wirt Robinson near Fort Adams, Newport, in the spring of 1890; a few instances of its occurrence in southern Connecticut. Breeds from eastern New York, New Jersey, and Pennsylvania, west to Iowa, south to the Gulf of Mexico, Central America, and northern Columbia.

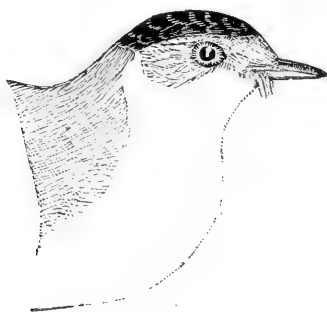
GENUS. FLYCATCHING WARBLERS. WILSONIA.

Size, small to medium, 4.75 to 5.70. Colors, golden olive or grayish above, with more or less black on crown; yellow beneath. No wing bands; tail spots, absent or present. Folded wings, not reaching beyond middle of tail.

Bill, moderately flattened and provided with short bristles at base. Wings not long but pointed. Eyes, large. These warblers somewhat resemble flycatchers in habit. They may be divided into two groups; A, in which the tail spots are absent; consisting of two species, one breeding chiefly north of New England, and one from Massachusetts northward; B, in which the tail spots are present, consisting of one species, breeding from Connecticut southward.

A; tail spots absent.

FIG. 53.



Wilson's Warbler.

WILSON'S WARBLER.

Wilsonia pusillus.

Plate XI, Fig. 6, male; Fig. 5, female.

Size, small, 4.75 to 5.50. Golden green above; yellow below; crown black. Very active. A not very common migrant in spring and fall; breeds mostly north of our limits.

MALE. Golden olive above, with the top of the head bluish black. Forehead, sides of head, and under parts, gamboge yellow.

FEMALE. Similar to the adult male, sometimes scarcely different, but often with the black of crown obscured by greenish tippings to more or less of the feathers. Autumnal birds of both sexes are similar to the spring dress.

DIMENSIONS. Length, 5.00; stretch, 6.80; wing, 2.10; tail, 2.15; bill, .35; tarsus, .70.

COMPARISONS. Somewhat like a Yellow Warbler, but with a more slender form and more active habits; also known by the black crown. No other warbler has this marking in combination with the unstreaked under parts.

NESTS AND EGGS. Nests placed on the ground, composed of grass and leaves, lined with fine grass and a few hairs. Eggs, usually four, sometimes five, pure white, rather thickly spotted with reddish brown and lilac. Dimensions, .60 by .48.

GENERAL HABITS. Although not a rare bird with us, Wilson's Warbler is interesting because it is not as often seen as many other of our warblers. It is one of the late spring migrants and often frequents willows and alders that grow along streams, but it also sometimes occurs in the gray birches and other low trees which border woodlands. At first glance it may be mistaken for a Yellow Warbler, but upon close observation it will be seen that Wilson's Warbler is much more slender in form than that species, and rather more active, frequently darting into air in order to snap up some passing insect. I have not often observed these birds feeding near the ground; on the contrary they appear to prefer the upper limbs of the low growths which they inhabit.

BREEDING HABITS. According to descriptions, this species always places its nest on the ground, concealed in a low thicket, often in a swampy place. The eggs are deposited from the middle to the last of June.

SONG. Wilson's Warbler ordinarily gives a low warbling song, and occasionally a harsher series of notes like "zee zee

zee zee-e." It has a low, but rather sharp, chirp of alarm or of annoyance.

MIGRATION AND BREEDING RANGE. I found this species on May 16, 1876, at Williamsport, Pennsylvania. It has been found in Massachusetts from May 7 to the last of the month. It breeds in the extreme north-eastern portion of Maine and northward to Hudson's Bay. In autumn it passes us in early September, but a few linger until the last of the month. I found it at Watsontown, Pennsylvania, as early as August 27, 1875, and continued to find a few as late as September 28. It winters in eastern Mexico.

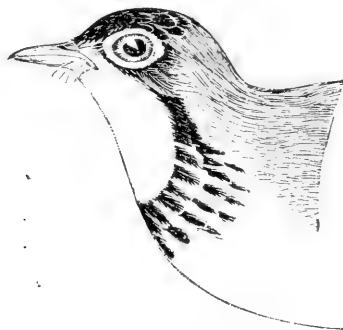
CANADIAN WARBLER.

Wilsonia canadensis.

Plate XII, Fig. 1, male; Fig. 2, female.

Size, medium, 5.00 to 5.70. Above, slaty gray; yellow beneath, with a necklace of black spots crossing breast. Rather common. Migrates through southern, and breeds in northern New England.

FIG. 54.



Canadian Warbler.

MALE. Slaty gray above, with more or less black on forehead and crown. Eye ring, line to bill, and beneath, yellow. Triangular patch beneath eye, ex-

tending to base of bill, and a rather broad band of spots crossing breast, black. Under tail coverts, white. Sometimes the spottings on the breast are so heavy as to form a continuous band, but are usually as given in Fig. 54.

FEMALE. Similar to the male, but tinged with greenish above; paler beneath, with the black markings much less distinct.

YOUNG MALE. Similar to the adult female.

YOUNG FEMALE. With the gray of back strongly tinged with greenish, and the markings beneath very pale, often barely indicated.

NESTLINGS. Strongly tinged with brownish above and on sides of head; lighter brown on throat, upper breast, and sides. There are two distinct wing bands of buff.

DIMENSIONS. Length, 5.50 : stretch, 7.75 ; wing, 2.40 ; tail, 2.10 : bill, .36 ; tarsus, .75.

COMPARISONS. Known by the bluish back, yellow under parts, and necklace of spots, the females and young usually having these indicated.

NESTS AND EGGS. Nests placed on the ground or near it, often on the sides of banks or mounds in woodlands. Composed of leaves and dry weeds, lined with rootlets and horse hair. Eggs from three to five, oval, white or buff, dotted or spotted with reddish brown and lilac, often more thickly on the larger end. Dimensions, .68 by .50.

GENERAL HABITS. As a rule, Canadian Warblers appear to prefer thick growths of woodlands; and, although sometimes found in dry places, they more frequently occur in swamps. They are active warblers, and besides moving in a very agile manner through the shrubbery, also often dart into air to snap up some flying insect. They are inclined to keep low in the undergrowth, but occasionally visit the higher branches of the trees; this is especially true during migration when they sometimes even visit orchards. During most seasons with us here in eastern Massachusetts the Canadian Warbler is not very common most years, yet I have not only found it common in spring, but at times even abundant.

BREEDING HABITS. Authors appear to differ somewhat in their accounts of the situations in which this species places its nest. Most writers state that the nest is placed on the ground, in undergrowth, by the side of a log or at the foot of a tree. Others say that the bird builds among the upturned

roots of fallen trees. Mr. Brewster, in his account of the birds of Winchenton, says that all of the nests that he has seen (a dozen or more), were built either on the side of a mound, or, as in one case at Lake Umbagog, on the side of a cliff, the situation chosen being higher than his head; and that the nests were more or less spherical in form, with the opening on the side. The eggs are deposited early in June.

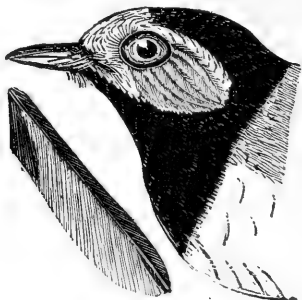
SONG. The song of the Canadian Warbler consists of from two or three to eight notes. These are uttered as a rather disconnected warble, and has a little of the quality of the call song of the Maryland Yellow-throat. It is not, however, as regular as the song of the Maryland, but is varied in its utterance. It is rather low, and while it can scarcely be considered a very musical performance, has a charm all its own.

MIGRATION AND BREEDING RANGE. The Canadian Warbler is a late spring migrant. I did not find them at Williamsport, Pennsylvania, in 1876, until May 12, and they are rarely found in New England anywhere until the second week in this month. They linger in eastern Massachusetts until the first of June. This warbler has quite a singular breeding range, being found along the mountain ranges from South Carolina northward, and in different places throughout New England; locally in the three southern states, but are generally distributed in the three northern. Thus they are known to nest quite regularly in the towns about Boston, as in Brookline, Dedham, Milton, Bedford, Belmont, and Concord. Also in Worcester and Berkshire Counties. In my *Birds of Eastern North America*, second editon, page 621, I have suggested that such a singular distribution may be explained by supposing that this species, in common with such birds as the Hermit Thrush and Solitary Vireo, which are similarly scattered in summer, were more universally distributed in the past when the forests were more continuous; then nesting over much of the intermediate region which they now avoid on account of

the changed environment. These warblers migrate in autumn about the second week in September; I found them at Watertown, Pennsylvania, in 1875, from about the first to the middle of this month. Winters from eastern Mexico and Central America to Ecuador and Peru.

B; tail spots present.

FIG. 55.



Head and outer tail feather of Hooded Warbler.

HOODED WARBLER.

Wilsonia mitrata.

Plate XII, Fig. 3, male; Fig. 4, female.

Size, 5.00 to 5.50. Black hood partly covering head, leaving a yellow mask on face. Greenish above; yellow beneath. Occurs in southern Connecticut in summer; accidental in Massachusetts.

MALE. Above, uniform greenish olive; forehead, sides of head, forming a mask, and beneath, yellow. Back of head, joining a patch beneath, forming a hood, black.

FEMALE. Similar in general coloration, to the male, but with less black on the hood.

YOUNG MALE. Similar to the adult female, but the black more or less overwashed with greenish.

YOUNG FEMALE. Quite similar to the young male, but the black is indistinct, sometimes wanting.

NESTLINGS. Pale grayish brown above and on chin, throat and upper breast, elsewhere beneath, pale yellow. There are two pale cinnamon wing bands.

DIMENSIONS. Length, 5.25; stretch, 8.70; wing, 2.60; tail, 2.30; bill, .40; tarsus, .75.

COMPARISONS. Known by the black hood and yellow mask. Young females without the hood may be distinguished by the yellow beneath, white tail spots, and absence of wing bands.

GENERAL HABITS. The Hooded Warblers prefer swampy thickets through which they flit with thrush-like adroitness, but betray their relationship to other members of the genus by their flycatching habits. In central Pennsylvania, where I became familiar with these birds, they occur among the great rhododendrons. Here the bright yellow colors of the birds formed a fine contrast to the dark green foliage of these shrubs as the warblers darted about among the shining leaves. Although not as active as the Redstarts, the Hooded Warblers resemble them in a habit they have of frequently spreading their tails, thus disclosing the prominent white markings at its tip.

BREEDING HABITS. The Hooded Warbler places its nest among low bushes in secluded places in swampy land. The time for breeding is from the last week in May until the middle of June.

SONG. The first time I ever saw the Hooded Warbler in spring my attention was attracted to it by hearing the loud, clear song, which suggests that of the Water Thrush, and is given at rather wide intervals throughout the day. The alarm note is a sharp chirp, also not unlike that of the Water Thrush.

MIGRATION AND BREEDING RANGE. I found these warblers at Williamsport, Pennsylvania on May 11, 1876. Breeds from Connecticut and Central New York, west to the Great Plains, and southward to the Gulf States. There are three records of their occurrence in Massachusetts in summer, and one in

Framingham, October 15, 1893, but there is no positive evidence that the bird has bred in the state, at least in recent years. I found the Hooded Warbler at Watsontown, Pennsylvania, in small numbers from September 6 to 18, 1875. It winters regularly in Mexico and Central America and rarely in Jamaica and Cuba.

GENUS. PAINTED WARBLERS. SETOPHAGA.

Size, medium, 5.25. Colors, black, with conspicuous reddish, or reddish orange markings on body, wings, and tail.

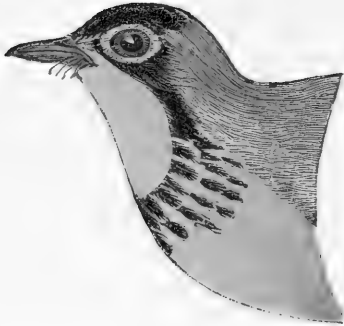
Bill, shorter, flatter, and wider at the base than in any of the preceeding genera, and with bristles at its base, but these are longer and more numerous even than in the last genus (see Fig. 42, E). Wings, of medium length. Tail, rounded and rather long (see Fig. 48, page 109). In form of bill, with its numerous basal bristles, and in some habits, the Painted Warblers resemble the Flycatchers, but a careful examination of the internal structure, as given below, will show that they are true Warblers (see General Conclusions at end of Summary).

Internal and other Structure, with the Redstart as a type.

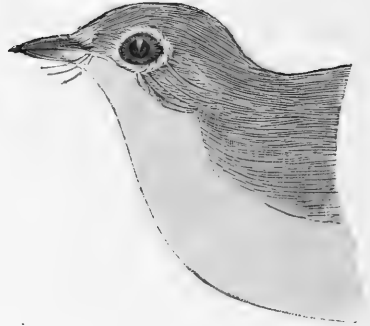
The specimen dissected was taken at Front Hill, Rhode Island, May 20, 1895. These observations were checked by the dissection of a second specimen taken at the same place, about the same time. Both specimens were adult males preserved in formalin.

Bill, broad and much flattened, especially on the upper mandible, where the transverse, horseshoe-shaped ridge is broader, more rounded, and better connected anteriorly than in many other of our warblers (see Fig. 42, Q). The rictal bristles are long, but in common with those of other warblers, have no well developed tuft of downy plumes at their base. This absence of conspicuous tufts at the base of rictal bristles is rather unusual. Among the families which possess these bristles I find the tufts present in the Thrushes, Wrens, Bluebirds, Shrikes, Kinglets, and Flycatchers ; absent in the Warblers, Vireos, Gnatcatchers, and, rather more expectedly, in the strictly nocturnal Goatsuckers that I have examined. In the Sparrows and Finches they are present in some genera and absent in others. Notwithstanding the variation shown in this last mentioned family, the absence or presence of these tufts appears to be sufficiently constant in the other families mentioned to prove of some value in determining the origin and relationship of birds having rictal bristles. In the present case this character is mentioned to show that, although the Painted Warblers possess nearly or quite as fully developed rictal bristles as do the true Fly-

PLATE XII.



1



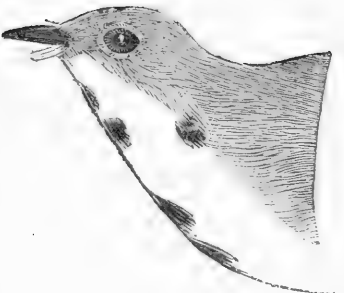
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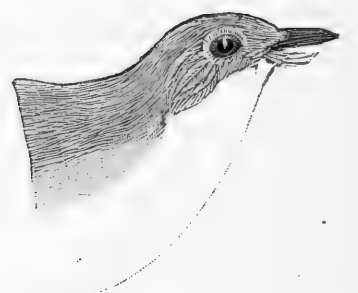
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6

EXPLANATION OF PLATE XII.

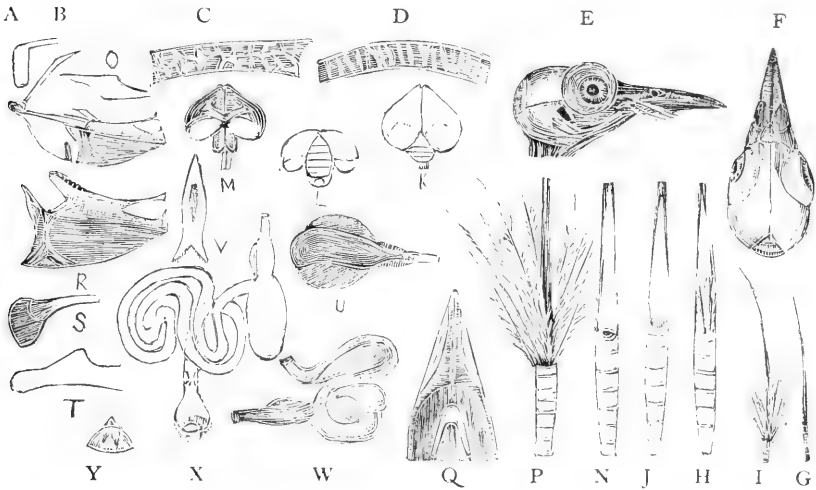
Canandian Warbler, 1, male; 2, female.

Hooded “ 3, “ 4, “

American Redstart, 5, young male, 6, female.

catchers, they differ from them in not having the basal tufts, these being conspicuous in the flycatchers (see Fig. 56, E, skull of Redstart, and compare with Fig. 57, A, upper mandible of Least Flycatcher; both are life-sized figures showing the rictal bristles; also see Fig. 56, G, rictal bristle of Redstart somewhat enlarged, and H and J, base of bristles of the same greatly enlarged; also N, base of bristle of Canadian Warbler; compare with I, bristle of Least Flycatcher, somewhat enlarged, and P, base of same bristle greatly enlarged). The function of rictal bristles appears to be to aid birds which feed upon flying insects in capturing their prey. These bristles are, of course, modified feathers, hence we should naturally expect to find them farthest departed from typical feathers in birds that have possessed them the longest time.

FIG. 56.



STRUCTURE OF REDSTART. A, terminal expansion of furcula; B, sternum; D, section of skull; E skull, side view; F, same from above; G, rictal bristle; H and J, the same greatly enlarged; O, costal process of sternum; Q, lower side of upper mandible; U, section of stomach; V, tongue; W, stomach and other organs; X, stomach and convolutions of intestine; Y, oil sac; M, base, L, back, K, top, of brain. N, rictal bristle of Canadian Warbler.

LEAST FLYCATCHER :- I, rictal bristle; P, same much enlarged; C, section of skull; R, sternum; S, terminal expansion of furcula; T, costal process of sternum. Figs. A, C, D, G, H, I, J, N, O, P, Q, S, T, and V are enlarged.

The skull is small and narrow, .60 long from base of bill to occiput and .46 broad. Its upper walls are, as in other warblers, double, the upper and lower portions being supported and attached together by tiny pillarets, which are in a few cases forked, but are mostly single. In the flycatchers, all of which have more or less spongy skulls, and thus also with double walls, these pillarets are seldom if ever, single, but are much branched, the branches often extending outward from the

middle to form anastomosing clusters (see Fig. 56 and compare D, section of skull of Redstart with C, section of skull of Least Flycatcher, both sections from top of skull, and both greatly enlarged). In the Redstart the divisions of the walls of the skull are a little farther apart than in most other warblers, but in the Least Flycatcher they are even more widely separated.

Brain; as a consequence of the small, narrow skull we find the brain of the Redstart also quite small and narrow. For direct comparison with the brain of the Redstart I have selected that of the Black-throated Green Warbler, as both birds are of about the same size and both largely woodland species. In order to present the facts to the reader in the best manner I give below the measurements of three portions of the brains of three species of warblers, the longest and shortest diameters being given, the width first. The cerebrum is measured across both lobes.

Measurements of Brains of Warblers.

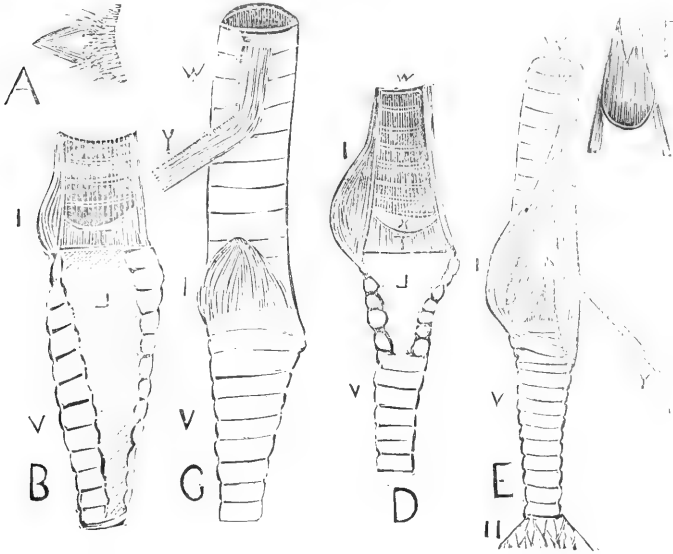
	Cerebrum.	Cerebellum.	Optic Lobes
Redstart,	.40 by .35,	.16 by .19,	.11 by .19.
Black-throated Green,	.42 by .40,	.14 by .16,	.12 by .19.
Chestnut-sided,	.47 by .48,	.13 by .15,	.12 by .18.

A little study of the figures given will show that the small size of the brain of the Redstart is due to a reduction of the cerebrum, and this is really smaller in bulk than the actual measurements show for it is considerably cut away, or narrowed, on the anterior portion. The cerebellum is not only proportionately larger in the Redstart than in the Black-throated Green, but is actually larger by measurement, and is also even larger than in the Chestnut-sided which is a considerably larger bird. According to the size of the body the optic lobes in the Redstart are one one hundredth of an inch narrower than in the Black-throated Green, but in proportion to the size of the cerebrum they are at least as large as those of that species, while they are actually as large as are those of the Chestnut-sided. I have not given a figure of the brain of the Black-throated Green, but on page 58, Fig. 33, B and B', will be found cuts of the brain of the Chestnut-sided which is about the same form; compare with cuts of the brain of the Redstart as given in Fig. 56: K, brain from above showing cerebrum, L, posterior portion showing cerebellum, M, base showing optic lobes; all of these figures are life size. If we knew nothing of the habits of the Redstart the form and proportions of the parts of the brain would teach us something of them. The large cerebellum indicates greater activity than in either of the two species with which we have compared it; while the small cerebellum points to less intelligence, its well developed optic lobes denote that its sight is good. The Redstart is certainly an active bird with acute eyesight. Any observer will testify to the fact that it is constantly darting into the air to capture insects which are often so tiny as to be invisible to the unaided human eye. Yet we should not expect to find a bird as intelligent that takes its prey when it is in open sight, as does the Redstart, as we should in species, like the others mentioned, which are obliged to search carefully among foliage for the larvae of insects, which not only conceal themselves quite expertly, but often resemble their surroundings so closely in color that they are difficult to distinguish.

Tongue, wide, thin, and horny, slightly hollowed, and with the tip provided with two small tufts of rather minute bristles that, in reduced size, extend along the

treminal third of the tongue (see Fig. 56, V). In the tongue of the Flycatchers, as typified by that of the Wood Pewee, there are no bristles at the tip, but a kind of forked, horny appendage that is evidently produced from behind as fast as it wears away at the tip.

FIG. 57



LEAST FLYCATCHER :- H, upper mandible; B, inside left bronchial tube; C, right side of syrinx and outside of right bronchial tube. REDSTART :- D, inside of left bronchial tube; E, syrinx and outside of right bronchial tube. WOOD PEWEE :- F, tip of tongue. ALL FIGURES :- w, trachea; v, sterno-tracheal; i, bruncho-tracheals; u, transverse bone; x, semiluna membrane; L, tympaniform membrane; u, bronchial tube; II, lung. All figures, excepting A, much enlarged

The trachea is a straight, rounded cylinder ; neither it nor the larynx differ to any noticeable degree from those of other warblers.

The long tracheal muscles, beginning at the larynx, descend the trachea until they reach a point a little above the syrinx where they divide to become the broncho-tracheal vocal muscles. Between these muscles, and consequently below their division, emerges the sterno-tracheal, and below this the small bronchials of which there are two pairs, one on each side of the syrinx. The bronchial tubes are each made up of fourteen rings, half of which are complete, that is they extend wholly around the tube, but the other seven are incomplete or half-rings. The spaces on the tubes thus left incomplete by the half-rings are occupied by thin, transparent membranes; the tympaniforms. Above the tympaniforms is a single thin bone to which they are attached. This bone crosses the windpipe from front to back and is called 'the transverse bone. On the upper part of this bone, projecting into the windpipe, thus standing upright between the entrances to the bronchial tube is a very thin, and very slight membrane; the semiluna. At Fig. 57, D and E, I have given a greatly en-

larged cut of the syrinx of the Redstart. E. shows the right side of the syrinx and the outside of the bronchial tube. W. is the windpipe where the cut end of the descending tracheal muscle can be seen. A little below this muscle divides, and these divisions reach their greatest development at a point opposite I. and between them arise the two short bronchials; above these, in the division of the broncho-tracheals, arises the sterno-tracheal. Y. It will be seen that the lower, or posterior, ends of both the broncho-tracheals and the bronchials are attached to the ends of the two upper half rings of the bronchial tube. V. The function of these muscles, thus attached, is, when contracted, to draw forward the half rings, thereby tensifying the tympaniform membranes to a greater or less degree (see Fig. 57, D, where is given a greatly enlarged view of a section of the syrinx and a view of the inside of the left bronchial tube, L, being the tympaniform membrane) then the air is expelled forcibly from the lungs (see *ib.*, II) causing this tensified membrane to vibrate; thus producing sound. But the high, shrill song of the Redstart is not produced by the vibration of this comparatively broad membrane, but by the small semiluna, *ib.*, X, which rests on the transverse bone, T. The broncho-tracheals are also attached to the ends of this bone, and by rotating it the narrow and thin semiluna membrane is twisted and tensified in various portions, while the air rushing past it from both bronchial tubes causes it to vibrate, thus producing the song. The song is, however, probably somewhat modified by the windpipe, which can be tensified to some extent by the action of the tracheal muscles extending down its sides, and to assist this tension the bird raises its head as it sings, thus drawing up the windpipe. Compare the cuts mentioned above with Fig. 7, page 4, B and C. and with Fig. 36, page 61, E and F, and it will be seen that the Redstart does not differ from other warblers in syringeal structure; it is, in fact, clearly a member of the great order of Singing Perchers.

If we now examine the syrinx of a member of the order of Songless Perchers we shall see that the tracheal muscles in descending the windpipe toward the syrinx do not divide, as in the Redstart and all other Singing Perchers, to form the broncho-tracheals, but remain single and become the sterno-tracheals (see Fig. 57, C, side view of the syrinx of the Wood Pewee, greatly enlarged; Y, is the sterno-trachealis), while the only other syringeal muscle is short and broad (see *ib.* I) and adheres all along the upper portion of the first half ring of the bronchial tube, *ib.* V. At B, is given a section of the syrinx and of the inside of the left bronchial tube. The tympaniform membrane, L, extends the entire length of the tube, but although the transverse bone is present, it does not bear a semiluna membrane; hence it can be seen that all of the sounds that the Wood Pewee is capable of uttering must be produced by the vibrations of the comparatively broad tympaniforms. Sounds produced by a broad membrane are lower in musical scale than are those made by one more narrow. Hence all of the notes of this flycatcher, even the softly-given, chattering attempt at a song, are in a minor tone.

The gullet and proventriculus of the Redstart do not differ in any perceptible degree from those of other warblers. The stomach is of medium size, a little larger than that of the Yellow Warbler (see Fig. 36, page 61, S and C, and compare with Fig. 56, U) but is smaller than that of the Chestnut-sided (see Fig. 36, page 61, H and I). The walls of the stomach of the Redstart are thicker than in the Yellow but not as muscular as in the Chestnut-sided (see Fig. 56, U, and compare with Fig.

36, page 61, H and I). The walls of the stomach of the Redstart are thicker than in the Yellow, but not as muscular as in the Chestnut-sided (see Fig. 56, U, and compare with Fig. 36, page 61, C and H). The fold of the duodenum is about normal in length, measuring .50 (see Fig. 56, W). The intestines are proportionately rather long, measuring about 3.75 from the pyloric exit of the stomach to the rudimentary coecal appendages, and are closely coiled; from the duodenal fold they curve outward for one turn, then inward to make such an abrupt turn outward and forward as to form a button-like protuberance. They now gradually unwind outward, and, keeping inside the first turn, pass forward outside the fold of the duodenum, then under it backward to the vent (see Fig. 56, X). Although this method of intestinal winding is about typical of the Warblers, the closeness of the turns and the button-like protuberance are unusual, somewhat resembling the intestines of the Flycatchers. The intestines in the Redstart make three full turns, while in most warblers there are only two and a half.

The sternum has a lower keel than in the Wood Warblers (see Fig. 56, B, and compare with Fig. 9, page 5, A); in fact, nearly as low as in the Yellow-throated Warblers, but the coracoids are not as long as in that group (see Fig. 9, B, page 5). As in other warblers the costal process is pointed terminally (see Fig. 56, O), and the terminal process of the furcula is elongated. In the flycatchers the keel is high, the costal process rounded, and the expansion of the furcula short and rounded (see Fig. 56, R, S, and T).

S U M M A R Y .

In some habits the Painted Warblers resemble the flycatchers. The bill is quite like that of the flycatchers, while the presence of the long, rather abundant rictal bristles makes this resemblance more complete. The rictal bristles, however, do not have basal tufts as in the flycatchers.

The skull and brain are not unlike those of the flycatchers, but the pillarets in the skull are more simple.

The tongue suggests those of the smaller flycatchers, but is clearly modified from a warbler type.

The vocal organs of the Redstart are clearly those of a warbler, and consequently of a Singing Percher.

The alimentary canal is similar to that of the warblers, excepting that the intestines suggest those of the flycatchers. The sternum is that of a warbler in all of its characters.

GENERAL CONCLUSIONS.

Although the Painted Warblers closely resemble Flycatchers, they are clearly Warblers with certain parts modified to enable the birds to capture insects in the air, these modifications being along similar lines to those found in the Flycatchers for similar purposes. A careful examination of the vocal organs will, however, forever settle the question as to whether the Painted Warblers belong to the Singing or Songless Perchers.

AMERICAN REDSTART.***Setophaga ruticilla.***

Frontispiece, adult male. Plate XII, Fig. 5, young male; Fig. 6, adult female.

Size, 5.25 to 5.65. Black, with six prominent spots of reddish orange. Active, constantly spreading its fan-like tail. A common summer resident in woodlands and groves.

MALE. Black above and on throat and breast; this color extending down on the sides to a greater or less extent; remaining under parts, white. Reddish orange patches on sides, wings, and tail.

FEMALE. Grayish olive above, white beneath, with the orange patches of the male replaced by yellow.

YOUNG MALE. Similar to the adult female, but the yellow patches are larger. This is the plumage of the first year; the second year black patches begin to appear on the throat and breast; during the third year more black appears and some tinging of reddish on the yellow patches, especially on the tail, where sometimes one side may be reddish and the other yellow.

NESTLINGS. Similar to the young but grayer and with no yellow on the sides, but the yellow patches are present on the tail and wings.

DIMENSIONS. Length, 5.38; stretch, 7.80; wing, 2.50; tail, 2.18; bill, .36; tarsus, .65.

COMPARISONS. Readily known by the six conspicuous orange or yellow patches, active habits, and fan-like expansion of the tail.

NESTS AND EGGS. Nests placed in trees, composed of hempen fiber of plants, fibrous bark of trees, pine needles, dead leaves, fine roots, and dry grasses, all woven together into a neat, compact structure, and lined with horse-hair, feathers, and fine grasses. Eggs, usually four, rarely five, grayish or greenish white, spotted and blotched irregularly with reddish brown, umber, and lilac. Dimensions, .50 by .69.

GENERAL HABITS. There are few among our Warblers that are more active than the richly-colored Redstart, for it is constantly flitting from bough to bough or darting into air in pursuit of its moving prey. This activity, combined with its habits of spreading its tail, and half opening its wings, renders it very conspicuous, and consequently it is one of the first of

the woodland species to be observed by those who are beginning to study birds. It not only occurs on the margins of woodlands but also in small groves, and occasionally among the largest of the ornamental trees that grow along streets. The Redstart is not a shy bird, and as it seldom wanders far from its chosen haunts, especially during the breeding season, is one of the best of our warblers to study. Summer or winter it does not change its habits, and wherever I have found it from the wind-swept Magdalins to the summer isles of the Caribbean, it has been the same busy little woodland sprite that I first learned to know in the early days of childhood.

BREEDING HABITS. The Redstart begins to build its nest the last week in May. The site selected varies somewhat, and although a forking branch is usually chosen, this may be so low that one can look into the nest while standing on the ground or it may be twenty or thirty feet high. I have found the nests in swampy thickets, on the branches of pines in heavy woodlands, and have seen one on the limb of a tree that overhung a village street. The eggs are deposited the first week in June, and early in July the hissing voices of the young may be heard as they follow their parents through the woodlands and supplicate for food.

SONG. As if correlated with its active habits the Redstart utters a very energetic song. It is not only given with energy, but is one of the highest and sharpest of warbler songs. It consists of from five to seven rapidly ejected notes all similar, thus the lay begins and ends abruptly. Of course there is a little variation among individuals, and the young have a shorter and rather less sharply given song. The Redstart announces his arrival in the spring with his song and continues to sing until late in June, but is silent by the first of July and we hear his song no more until the following spring. Some of my pupils have said that the Redstart sings like a Yellow Warbler. A little study of the two songs will show

that the song of the Yellow Warbler is not the same from beginning to end, is longer than the Redstart's, ends less abruptly, and is uttered with less energy. While the more softly given song of the young male Redstart is more nearly like the lay of the Yellow Warbler, it is much shorter and rather more quickly given.

MIGRATION AND BREEDING RANGE. The Redstart breeds all over the United States, at least east of the Rocky Mountains, and as far north as Alaska and the Magdalin Islands. I have found it more or less common on the Bahamas in different years all winter, excepting at Inagua. I have a young male taken at Murrell's Inlet, South Carolina, December 11, 1900. It also winters in the West Indies and from Mexico to northern South America. I found a few migrating across the Island of Cayman Brac as early as April 5, 1888, and it became common by the twelfth of the month. The general migration across the Bahamas begins about the middle of April, and I have seen specimens at Nassau as late as May 10. A few appear in Massachusetts as early as the last of April, but the greater portion do not arrive until the first week in May. In autumn it leaves for the south by the middle of September, but a few may remain until the last of that month.

APPENDIX.

Additional study of the American Warblers has caused me to make the following corrections.

The tongue is thinner and more horny in the Redstart than in any other species in the family (see page 3, last paragraph, also page 126 and Fig. 56, V, page 125.

The vocal muscles are sometimes more in number than I have stated on page 4. Thus, rather unexpectedly, I find that in the Redstart there are five pairs of singing muscles (see page 127).

On page 4 I have spoken of the song of the Prairie Warbler as being "exceedingly sweet". When I made this statement I probably had in mind the song as I heard it on the Bahamas and among the Florida Keys (see page 52). I would not now apply so extravagant a term as "exceedingly sweet" to the song of this species.

The lining membrane of the stomach of some species of warblers is sometimes hard, as in the Redstart, Chestnut-sided and other Wood Warblers.

The following are additional notes to the habits, songs, etc., of the various species.

BLACK AND WHITE WARBLER. In June, 1901, I found a nest of this species in Auburndale. It was placed near the base of a low shrub in a thicket of small trees and bushes. The female was sitting on the nest which was so nearly dome-shaped that the bird could only be seen from directly in front. She was very tame and did not move even when I stooped to examine her, and it was not until I had nearly placed my hand on her that she flew off. She then quietly retreated to a low shrub near, but without exhibiting any signs of alarm, nor did she appear at all disturbed when the members of my bird class looked at her eggs. Later I took other classes to see the nest when the bird behaved much as at first. She succeeded in rearing a brood of young. On May 12, 1904, I found another nest not far from the one mentioned above, but it was in an open woodland near the foot of a tree, and was not con-

cealed in any way. When found the nest was empty, but on May 23 it contained five egg and one of the Cowbird. A few days later the nest contained two eggs of the warbler and the Cowbird's. These were cold and the nest was probably abandoned.

Besides the two methods of singing given on page 12 the Black and White Warbler utters a more musical lay, and at times gives quite a sweet song, through which, however, it often mingles some of the sharper, lipping notes. Occasionally this peculiar song is given in autumn, but much softened.

BLACK-THROATED BLUE WARBLER. Southern examples found breeding from the mountains of Pennsylvania southward to western North Carolina have been separated sub-specifically from the northern form under the name of Cairns' Warbler, on account of the darker colors above and the presence of more or less black on the back, but I have seen specimens from Massachusetts which had the back quite black.

The song of a Black-throated Blue heard at Newton Upper Falls, May 18, 1904, consisted of three rather hollow sounding notes like, *wah wah wah*, followed by a trill of about four notes so rapidly given as to sound nearly like a single lisp.

Miss Alice C. Kendall reports the Black-throated Blue as occurring at Holden, Massachusetts, all summer; I saw a specimen when with her there August 25, 1904.

CHESTNUT-SIDED WARBLER. On page 67 will be found a description of the song and a comparison between it and that of the Yellow Warbler. Quite a common song of the Chestnut-sided is a rather low, harsh warble, consisting of from four to six notes. These notes are given in about the same tone from beginning to end, but are, perhaps, uttered a little more faintly toward the termination of the song. I have heard this song as early as May 11 and as late as August 13, but the late

songs are quite feeble. Sometimes the *to-wecher* of the usual song is added to this harsh lay. On June 23, 1904, I heard a song given by this species which may be rendered by the syllables, *ah swe swe swe to-wecher*.

PRAIRIE WARBLER. Song heard on June 3, 1903, *ze ze ze ze ju-p-ta*, a little ascending on the last two syllables, otherwise a monotone. Again, sung by the same bird, a little ascending from first to last, but not at all musical. The Prairies begin to sing on the Bahamas about the middle of March.

It breeds from Florida to Massachusetts and possibly on some of the Bahamas.

LAWRENCE'S WARBLER. In Bird Lore for July and August, 1904, page 131, is an article on the nesting together of a male Lawrence's Warbler and a female Blue-winged, by Mr. Isaac Bildersee. Now, while at first sight, the facts as far as they were apparent from observation, are strongly in favor of the theory of the hybridization of the two species mentioned, the careful student will see that there still remains much to be explained. So much, in fact, that, while such observations as those made by Mr. Bildersee are of great value, they must be regarded as only one link in a chain, but much more evidence must be accumulated before we can decide to which of the three theoretic chains, given on pages 85-88, this particular link belongs.

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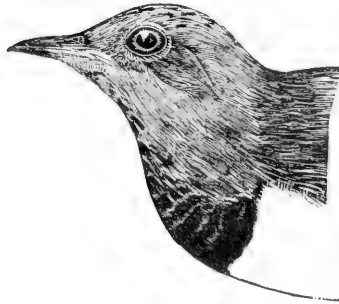
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THE END.

E R R A T A .

Aside from a few self-correcting typographical errors, please make the following changes:—

Page 2, 3d line above cut, for 2 B read 2 A.

Page 3, 10th line from bottom, for Maryland Yellow-throat read Greater Bahama Yellow-throat.

Page 4, Fig. 4, the figure above C is of the bronchial tube of the Maryland Yellow-throat, and references should be changed accordingly.

Page 4, 9th line from top, for lower larynx read syrinx.

Page 8, 4th line from bottom, for Fig. 16 read Fig. 18.

Page 19, 7th and 9th lines after Fig. 24, in both transpose B and C.

Page 26, 9th line from bottom, after C, in brackets, add, and Fig. 26, page 30.

Page 38, 5th line from bottom, for vanguard read rearguard.

Page 39, under head lines of Blackburnian Warbler, following plate IV, change to Fig. 3, male: Fig. 4, female.

Page 59, in explanation of Fig. 34, near end of 2d line, transpose C and D.

Page 124, 13th line from bottom, for Fig. 42 read Fig. 56.

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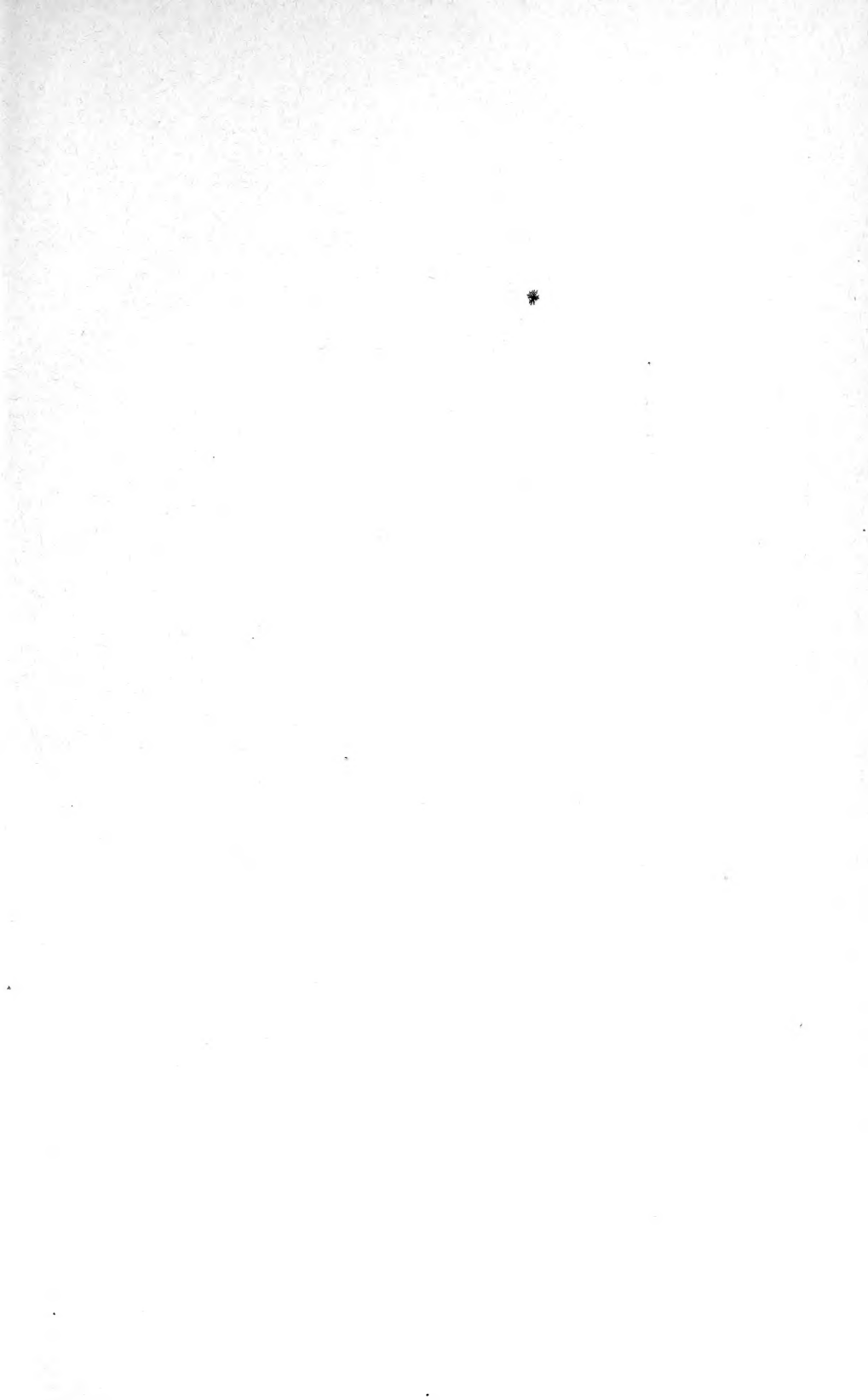
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